Rules Development Implementation Working Group (RDIWG)

Meeting No. 6: Agenda

Location: Level 3, Governor Stirling Tower, 197 St Georges Terrace, Perth

Date: Tuesday, 23 November 2010

Time: 9.00am – 2.00pm

1. Previous meeting's minutes
2. Balancing Provision Options
3. Ancillary Services Procurement
4. Reserve Capacity Refunds
5. STEM timing and related issues
6. General Business
7. Outstanding Action items

Independent Market Operator

Rules Development Implementation Working Group

Minutes

Meeting No.	5
Location:	IMO Board Room Level 3, Governor Stirling Building, 197 St Georges Terrace, Perth
Date:	Tuesday 2 November 2010
Time:	Commencing at 9.07am to 1.33pm

Attendees	
Allan Dawson	IMO (Chair)
John Rhodes	Market Customer
Corey Dykstra	Market Customer
Steve Gould	Market Customer
Geoff Gaston	Market Customer (proxy for Patrick Peake)
Andrew Everett	Market Generator
Shane Cremin	Market Generator
Andrew Sutherland	Market Generator
Phil Kelloway	System Management
Paul Hynch	Office of Energy
Chris Brown	ERA
Courtney Roberts	Minutes
Douglas Birnie	Presenter
Jim Truesdale	Presenter
Matthew Pember	Presenter
Greg Thorpe	Presenter
Peter Ryan	Presenter
Jenny Laidlaw	Observer
Troy Forward	Observer
Winston Cheng	Observer
Jacinda Papps	Observer
Will Street	Observer
Apologies	
Patrick Peake	Market Customer

Item	Subject	Action
1.	**WELCOME AND APOLOGIES / ATTENDANCE** The Chair opened the 5th meeting of the Rules Development Implementation Working Group (RDIWG) at 9.07am. The Chair welcomed Mr Peter Ryan to the meeting. An apology was received from: • Patrick Peake – Market Customer.	
2.	**PREVIOUS MEETING'S MINUTES** The minutes of RDIWG Meeting No. 4, held on 11 October 2010, were circulated prior to the meeting. The RDIWG endorsed the minutes as a true and accurate record of that meeting. *Action Point: The IMO to publish the minutes of Meeting No. 4 on the website as final.*	**IMO**
3	**BALANCING PROVISION OPTIONS** Mr Peter Ryan gave a presentation on Griffin Energy's proposed approach to implement competitive Balancing in the Wholesale Electricity Market (WEM). The approach leverages the existing Dispatch Instruction mechanisms and standing data provisions, and involves both Verve Energy and Independent Power Producers (IPPs) submitting Balancing bids/offers via registration standing data to the IMO for Peak/Off-Peak and up/down dispatch. A copy of the presentation is available on the IMO website. The RDIWG also discussed the contractual and dispatch based balancing option outlines circulated by the IMO prior to the meeting, and the feedback on the options provided by RDIWG members. It was noted that most of the feedback had expressed a preference for the dispatch based option. The following points were discussed. • It was suggested that given the expected increases in Balancing and Ancillary Services costs a decision needs to be made on whether to break the relationship between System Management and Verve Energy and introduce competitive Balancing, or else remove the 3000 MW cap on Verve Energy generation capacity. It was noted that the latter option did not fall within the scope of the Market Evolution Program (MEP). • Some members questioned whether the proposed bid/offer structure (the same as that currently used for IPP pay as bid Balancing submissions) would provide sufficient granularity. • There was general agreement that the key issue with the proposal was how to create a dispatch merit order that allowed System Management to choose which of the available Verve Energy and IPP Facilities to dispatch. • There was some discussion about how a Dispatch/Resource Plan for Verve Energy could be generated, and how/whether Verve Energy could provide Facility based increment and decrement bids for Balancing relative to this plan. The limitations of the current dispatch plans provided to Verve Energy were noted. • The perception of transparency issues around the current	

Item	Subject	Action
	System Management/Verve Energy dispatch process was discussed. Mr Phil Kelloway offered to give a presentation on the dispatch process to the RDIWG at the next meeting. • Concerns were raised that the proposal would adversely affect the dispatch process by reducing the flexibility available to System Management. There was some discussion about the extent of the problem and the ways in which it could be addressed. Some members suggested the ability for System Management to call on a wider range of plant for Balancing should produce better outcomes in terms of security and reliability. • There was some discussion around the reasons for the proposal limiting offers to +/- 10 MWh blocks for committed Facilities. It was suggested that any mechanism would need to deal with commitment decisions to be successful. • There was discussion about the impact of Load Following on Verve Energy's ability to submit price offers for Balancing, i.e. how it would bid if it did not know System Management's Load Following requirements for its plant. • There was some discussion about how IPPs would form their Balancing bids in situations where they had limited fuel. • The need to support renominations was discussed. • There was discussion about whether Balancing offers needed to be made at the Facility level or whether a portfolio approach could work. *Action Point: System Management to provide a presentation to RDIWG members at the 23 November 2010 meeting, on the current process for the dispatch of Verve Energy facilities by System Management.* *Action Point: The IMO to work with System Management and Verve Energy to investigate possibilities for generation of the dispatch plans and balancing offers/bids needed to support a competitive Balancing solution and develop a dispatch-based option for the provision of competitive Balancing and present a proposal to RDIWG members at the 23 November 2010 meeting.*	**SM** **IMO/SM/ Verve**
4	**BALANCING PRICE FORMATION** Mr Jim Truesdale provided the RDIWG with a summary of the investigation into MCAP pricing anomalies. Details of the analysis and its findings are available in the Discussion Paper: "Balancing Price Formation", included in the papers distributed for this meeting and available on the IMO website. In response to questions from RDIWG members, Mr Truesdale presented a modified version of Figure 13 in the Balancing Price Formation paper, which shows the cumulative impact on average MCAP of adjusting the Relevant Quantity to : • remove Resource Plans and shortfalls where the participants concerned never submit STEM supply curves; • remove Resource Plans and shortfalls in Trading Intervals in which the relevant participant did not submit a STEM supply	

Item	Subject	Action
	curve or all tranches in its STEM supply curve submissions were above the STEM clearing price in all Trading Intervals; and • account for inconsistencies between Resource Plan/shortfalls and STEM supply curve quantities prices below the STEM clearing price. The modified version of Figure 13 is attached as Appendix 1. Mr Truesdale explained the difficulties involved in trying to further separate out the causes of the MCAP anomalies. The RDIWG agreed that this task was more complex than originally perceived, and decided not to pursue the investigation further at this time. *Action Point: The IMO to consider whether in the short term it should request Market Participants that do not make STEM supply curve submissions to not submit Resource Plan/Shortfalls and provide the information to System Management separately.* *Action Point: The IMO to confirm the MCAP percentages in the handout Jim Truesdale distributed at the end of the meeting.*	**IMO** **IMO**
5	**MEP PROGRAM SUMMARY** Mr Douglas Birnie sought feedback from RDIWG members on the draft Market Evolution Program Summary. The following points were discussed. • It was questioned why the scope of the MEP did not include the whole of the Reserve Capacity Mechanism. • Some members expressed concerns about some details in the Executive Summary. It was agreed that members should provide specific feedback on the document by email. • The proposed budget for the program was discussed. It was noted that the budget represented a maximum requirement, and that the actual amount used would depend on the complexity of the implemented solutions. • The method of funding the program was queried. It was explained that Treasury would lend the IMO the necessary funds, and that the costs would not be capitalised and reflected in Market Fees until the changes had been implemented. It was noted that the program had not triggered a Declared Market Project. • Details of the expected OPEX impacts of the program were requested. • The expected costs of the program for other participants were questioned. • Mr Matt Pember provided additional details about the IT budget, the IT areas to be addressed by the program and the reasons for the interlinking of the base and MEP IT roadmaps. • It was noted that the budget assumed a certain timeframe for the making of key decisions, and that delays in reaching these decisions would extend the project and increase its costs. The budget assumed that most work would be completed by	

Item	Subject	Action
	December 2011. • The IMO offered to give a presentation on the MEP at the offices of any interested Market Participant. • It was noted that the ERA was not involved in the approval process for the program. The methods by which the IMO would inform stakeholders about the MEP and its progress were discussed, including publication of documents on the IMO website and meetings every three months with the wider community. *Action Point: RDIWG members to email their comments on the draft Market Evolution Program Summary to the IMO by 5.00pm on Wednesday 10 November 2010.* *Action Point: The IMO to incorporate the feedback received on the Market Evolution Program Summary and then use as a public reference document for the Program subject to the approval of the IMO Board.* *Action Point: The IMO to provide RDIWG members with further details on the IMO IT Roadmap, the estimated OPEX impacts of the Market Evolution Program and the estimated impact of the Program on Market Fees.* *Action Point: The IMO to offer site presentations to Working Group members and invite Working Group members to participate in the presentations.*	**All** **IMO** **IMO** **IMO**
6	**GENERAL BUSINESS** The following issues were discussed: • the need for a wider review of the entire Reserve Capacity Mechanism; • issues around the constrained network approach to planning; • concerns around the extent of Demand Side Management in the market; • the status of the current work on Capacity Cost Refunds (the IMO advised that a paper would be presented at the next meeting); and • the appropriateness of the runway method for Spinning Reserve cost allocation.	
7	**NEXT MEETING** Meeting No. 6 will be held on Tuesday 23 November 2010 (9.00am-2.00pm).	
8	**CLOSED:** The Chair declared the meeting closed at 1.33pm.	

Independent Market Operator

Balancing Support

Date: 23 November 2010

Contents

Independent Market Operator
Level 3, Governor Stirling Tower
197 St George's Terrace, Perth WA 6000
PO Box 7096, Cloisters Square, Perth WA 6850
Tel. (08) 9254 4300
Fax. (08) 9254 4399
Email: imo@imowa.com.au
Website: www.imowa.com.au

1 PURPOSE

This paper has been prepared for the Rules Development Implementation Working Group (RDIWG). The aim of the paper is to identify a mechanism for other Market Participants to participate in balancing on a competitive basis which:

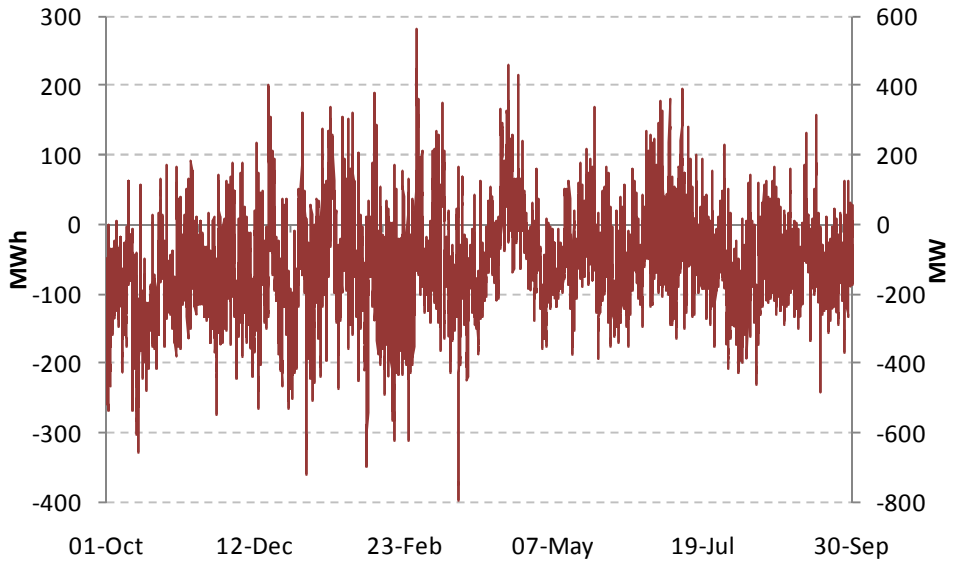
- Is consistent with the current market design.
- Will provide net efficiency gains.
- Is consistent with possible long term market design enhancements.

2 BACKGROUND

In the WEM, most electricity is accounted for commercially well in advance of dispatch. i.e. through bilateral contracts, self-supplied load or the day-ahead Short Term Energy Market (STEM) facilitated by the IMO. On the trading day, participants are expected to operate in each trading interval to the Net Contract Positions (NCPs) they have established following the STEM.

As contractual commitments are fixed well in advance of dispatch, actual supply and demand within a trading interval inevitably differ from contractual commitments. For example, due to facility outages, demand and wind forecasting uncertainties. Figure 1 illustrates the quantity of balancing in each trading interval for the year ending September 2010.

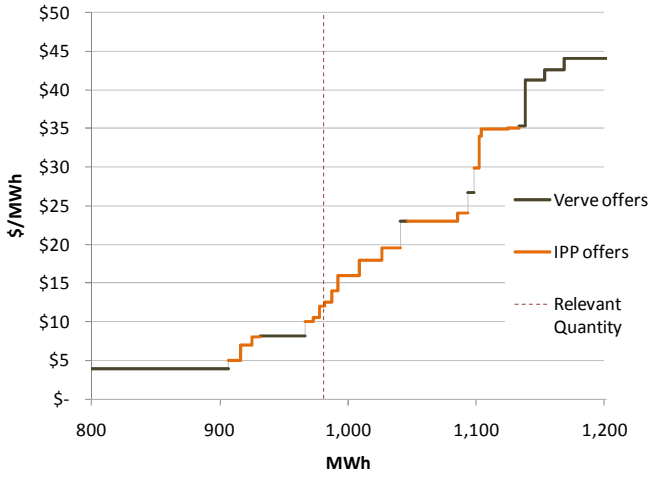
Figure 1: WEM half hourly balancing quantities - year ending 31 Mar 2010



Balancing support services are therefore required to ensure that energy mismatches within each trading interval can be managed and, in conjunction with ancillary services, system security maintained. In the first instance frequency regulation (currently called load following ancillary service[1] in the WEM) continuously follows small variations in demand and supply from expected levels. If System Management observes that the operation of ancillary services plant is trending to the maximum or minimum of the available range, balancing services will be dispatched with the aim of bringing the frequency regulation provider back to the middle of its range.

At present, the default balancer, Verve Energy (Verve) is obliged to provide the balancing support service and IPPs other Market Participants are largely excluded from doing so (except in system security situations or as alternatives to the dispatch of Verve distillate facilities). The cost of balancing is therefore likely to be higher than it needs to be because not all potential resources are available for balancing much of the time. For example, Figure 2 shows a portion of the market supply curve (from STEM supply curve submissions) where participants other than Verve would have been dispatched had the curve been a competitive balancing curve (assuming STEM submissions would not be different in such a scenario).

Figure 2: Portion of market supply curve (1 Feb 2010, 10 pm)



Analysis of STEM supply curve submissions for the year ending September 2010 indicates that had it been possible to dispatch other generators' based on their STEM submissions, generation cost savings of the order of $1m may have been realised[2]. There is a degree of uncertainty in this analysis, as explained in Appendix 1, given that some of the generation in participants' supply curves may not have in fact been dispatchable (for example, due to short

[1] Undergoing review as part of the Renewable Energy Generation Work Package three, see www.imowa.com.au/REGWG.

[2] For example: implied resource cost savings assuming supply curves are cost reflective. Given the requirement that Verve submit at SRMC this is a reasonable assumption. The effect on balancing costs faced by participants will have been different but difficult to assess given MCAP price distortions. See "Balancing Price Formation", RDIWG paper, 2 November, 2010.

term de-commitments). Making an accurate assessment of costs is a complex undertaking but a relatively conservative approach has been taken.

Balancing requirements are expected to increase as the level of intermittent generation grows. Looking forward, gas, currently used to fuel the majority of resources providing balancing, is likely to become more costly and less flexible, making it more difficult and costly for the default balancer to provide the service.

Achieving wider participation in balancing support therefore offers potential short and long term economic benefits[3].

3 CONTEXT

The possibility of moving to a more traditional market design with all participants subject to the same rules and obligations was investigated prior to the establishment of the RDIWG. Two design options were considered whereby all generators would submit offers and be dispatched on the same basis i.e. on a gross basis (offering all capacity for dispatch and managing contract positions through their offers) or on a net basis (offering capacity for dispatch above or below resource plans/contract positions). Rather than pursue these options at this stage a decision was taken to maximise the current hybrid structure of the WEM, with Verve Energy remaining the default balancer.

In this regard, the starting point for considering how to open up the balancing support service to competition can be summarised as follows.

Default Balancer (Verve)	Other Market Participants	System Management
• Scheduled and dispatched by SM (using Verve guidelines)	• Scheduled and dispatched in accordance with their resource plans	• Discretion wrt security • Unable to dispatch IPPs – Security aside
• Obligatory real time balancing	• Excluded from real time balancing (except for system security/ pay as bid)	• Flexibility regarding Verve facilities • Basic dispatch systems
• Risks of disconnects between prices and dispatch internalised to Verve	• Exposed to balancing costs (including distortions)	• Transparency?

[3] For the purpose of this paper, it is assumed that providers and causers of balancing support requirements will face cost reflective prices. See: "Balancing Price Formation", RDIWG paper, 2 November, 2010.

Without substantial changes to the current market design and systems it is impractical for Verve, as the default balancer, and IPPs to be treated on the same basis. A fundamental impediment is that whereas other Market Participants dispatch their schedulable facilities in accordance with resource plans, Verve facilities are scheduled and dispatched by System Management. Verve facilities are scheduled and dispatched on a gross basis to supply demand net of other generation which is fixed, subject to facility performance/outages, or intermittent, such as wind farms.

As shown in Figure 1, the balancing requirements can be substantial. Uncertainty about balancing requirements has implications for the way Verve's unit and fuel requirements are scheduled in anticipation of dispatch. For example, Figure 3 illustrates the level of day ahead demand uncertainty when the first Verve dispatch plan that takes resource plans into account is prepared the afternoon before.

Figure 3: Actual vs forecast operational load (Jan to May 2010)

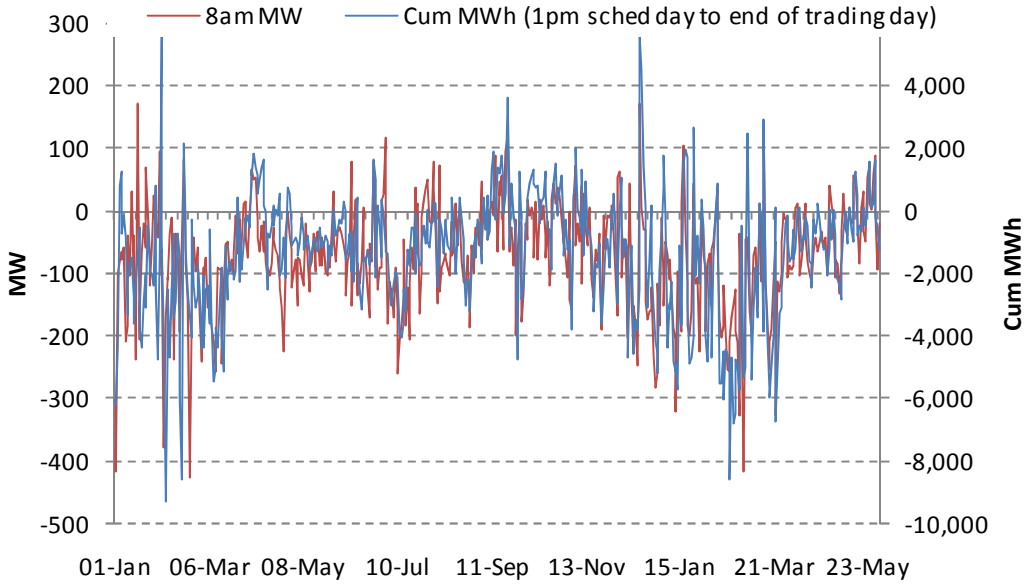


Figure 3 shows differences between System Management's operational load forecast prepared at around 1pm on the scheduling day compared to actual operational load. Differences are shown for average MW in the first interval of the trading day (8am the following day) and the cumulative MWh difference from 1pm on the scheduling day to the last interval of the trading day (7:30 am two days ahead). Note that Figure 3 only relates to demand uncertainties and excludes uncertainties associated with wind generation and other Market Participants' facilities generally.

Under the current Market Rules other Market Participants self-commit and dispatch their facilities in accordance with their resource plan submissions, reflecting Net Contract Positions and self supplied load. In contrast, Verve is not scheduled in accordance with its Net Contract

Position or with reference to the prices and quantities in its STEM supply curve submission. As the default balancer, Verve is scheduled and dispatched by System Management using guidelines supplied by Verve. The guidelines are a form of merit order with a range of inter-temporal parameters for System Management to take into account when scheduling the Verve facilities. It is understood that the guidelines do not include explicit pricing information. It is necessary for System Management to exercise discretion in its application of the guidelines, for example changing the planned commitment (in timing and unit) of Verve facilities. Such changes can be driven by system security requirements or because the existing plan is moving outside the guidelines (or both).

Introducing competitive balancing requires that a merit order be developed whereby the default balancer and other Market Participant resources can be dispatched for balancing purposes within the constraints of the current market design. In this regard, common themes in recent RDIWG discussions include:

- The default balancer and other Market Participants submitting price-quantity offers/ bids (increments and decrements) indicating prices at which they are prepared to be dispatched up/down for balancing support and by how much.
- Offers and bids being ranked in price order to form a balancing merit order for System Management balancing dispatch purposes (subject to System Management intervention for system security purposes).
- The balancing price being set at the price of the marginal offer/bid dispatched in merit order by System Management.

Implementation of these design principles, which represent a significant change, raises some practical issues that need to be carefully considered in developing design details. In particular:

- The form of offers and bids and the practicality and commercial implications of facility based offers and bids submitted the day before the trading day starts.
- The reference point for the offers and bids of the default balancer (e.g. vs a Net Contract Position (NCP) or dispatch plan).
- Potential capability (systems and resourcing) implications, particularly for Verve and System Management.

4 FORM OF OFFERS

Leaving aside transmission and co-optimisation of energy and ancillary services, the form of offers in electricity markets can be generally classified as complex or simple.

Under a complex offer approach, participants submit price and quantity information along with technical and commercial parameters (start-up times, costs, minimum run times, daily energy

constraints etc) for example, along the lines of the current WEM balancing and standing data submissions. The market (System Manager/Market Operator) then decides on behalf of Market Participants when to commit units and use constrained fuel supply (among other things) looking out over multiple trading intervals.

Under a simple approach, offers consist of price/quantity pairs only, along the lines of IPP balancing price submissions now (without the standing data except for typically intra-interval ramp rates). The market minimises the cost of dispatch on an interval by interval basis[4] and multi-period decisions (commitment and fuel limits etc) are expressed and managed through participants' offers. To varying degrees, participants are provided flexibility to adjust their offers subject to a cut-off point (gate closure) prior to dispatch.

The Verve guidelines could be likened to a complex offer regime with System Management making the key timing and commitment decisions on Verve's behalf, albeit with a fairly basic tool set. As such there is no balancing merit order within which other Market Participants can be inserted for dispatch purposes. The Market Rules provide an indirect mechanism whereby System Management or Verve can enter Balancing Support Contracts with IPPs. Otherwise, allowing participation on an efficient basis requires a balancing merit order in some form to be established within the current hybrid design of the WEM.

The proposition has been advanced that once the initial Verve dispatch plan has been prepared, following submission of resource plans, Verve and IPPs would submit offers and bids for balancing purposes and these would be used to form a balancing merit order. What form these should take is an important issue.

IPPs are at present dispatched away from resource plans by System Management for system security purposes or to avoid the use of liquid fuelled facilities. The order in which they are dispatched is determined by System Management with reference to the dispatch merit order prepared by the IMO from IPP balancing price data, including for de-commitment of units. These could also be likened to complex offers but with an important distinction. The dispatch merit order is for occasional one-off interventions, and as such sophisticated market software is not required (or justified) to make trade-offs between competing offers over with different timeframes. IPPs dispatched are settled at their pay as bid prices and Verve is not specifically included in the dispatch merit order.

For balancing purposes, for IPPs with facilities that are in service, or will be when the time comes it should be relatively trivial to submit offers and bids relative to their resource plans along the lines of the current supply increase and supply decrease prices in balancing submissions (notwithstanding fuel limits). Where minimum or maximum fuel limits exist, offers/ bids could be constructed so as to manage the risk of exceeding hourly or daily limits – that is

[4] Taking into account conditions at the start of each interval but otherwise independent of other trading intervals.

this risk could be internalised within IPPs in the same way they would if the market operated with simple offers comprising price-quantity pairs.

Alternatively complex offers, for example including daily energy limits and minimum up/down times, would require market software that could make trade-offs over the trading day or an acceptance by System Management that routine assessment would be practicable and by IPPs that the resultant schedules would be approximate but satisfactory. Alternatively if deemed worthwhile, the possibility of flexibility to revise offer/ bid quantities could be considered.

For IPP facilities that are not in service, but which can be started quickly, it should also be relatively straightforward to construct simple price/ quantity balancing offers, accepting the risk that a facility may only be called for a short period. Conditional (complex) offers could be considered, for example the ability to specify minimum run times, although evaluating such options would require market software to make trade-offs (or acceptance of potentially arbitrary decisions). Again, if deemed worthwhile, some flexibility to revise offers could also be considered.

For a slower starting unit that is not in service, the IPP could either decide to submit an offer ensuring that the unit starts in anticipation of a commercial opportunity or, more likely, decide not to submit an offer. Again complex offers could be considered, including, for example, start-up costs and minimum run time etc. However sophisticated market software, or flexibility to revise offers, would be required to make such trade-offs.

Similar issues would apply regarding the possible shutdown of a slow starting unit that is in service, for example, for an overnight low load situation.

Assuming simple offers, under most circumstances it would be relatively straightforward for an IPP to decide whether or not to submit balancing offers/ bids. Whether there would be greater opportunities to participate if there were flexibility to revise offers/ bids is unclear but there would clearly be scope for participation without such flexibility. Adopting complex offers/ bids would require sophisticated market software, inconsistent with the aims of this exercise.

Now consider things from the perspective of the default balancer. Verve does not have facility resource plans matching its Net Contract Position. Instead System Management prepares a portfolio dispatch plan for Verve on a gross basis to meet expected demand net of expected intermittent generation and resource plans. Implicitly the dispatch plan anticipates balancing requirements and it is reviewed and updated in line with Verve guidelines as market conditions/ forecasts alter.

Assume for now that the default balancer has to submit facility offers/ bids relative to its NCP – in effect parallel to the submission by IPPs around their resource plans. Verve would need to

take account of expected unit commitments and fuel constraints, with reference to the dispatch plan prepared by System Management.

If Verve were to submit simple facility based offers/ bids it would face similar issues to those noted above for IPPs but with the added complication that it is obliged to provide balancing support. It *must* submit offers/bids. Based on experience in other markets Verve is likely face significant practical issues without the flexibility to revise simple facility-based offers and bids. We are not aware of any market with gate closure of up 40 hours ahead of dispatch, at least without complex offers, and markets with simple price-quantity offer structures generally operate with gate closure between a few hours to near real time.

It is important to acknowledge that decisions about the commitment, and timing, of Verve facilities and management of gas are reviewed continually. They are not fixed at the time the initial dispatch plan is prepared, providing flexibility to respond to changing expectations (i.e. implicitly balancing demands) over the subsequent 40 hours or so. In contrast, subject to unforeseen circumstances, other Market Participants are able to lock in commitment decisions, including timing, when they submit resource plans the day before. They could choose to submit balancing offers/ bids in a way that did not interfere with commitment decisions or if need be not submit offers or bids at all.

Given the amount of uncertainty about balancing requirements at the time Verve's facility based offers/ bids would be submitted, locking in mid merit commitment and fuel management positions in the initial dispatch plan for up to 40 hours would lead to inefficiencies in the dispatch of Verve facilities, increasing its overall operating costs. This would be of greater concern if IPP participation was limited.

On the other hand, flexibility to resubmit simple facility-based offers/ bids would require after-hours capability to review, resubmit, accept offers and bids and update dispatch balancing merit orders. It would also require ongoing market forecasts to support participant decision-making. Verve would also need to develop the capabilities to formulate facility based offers/ bids. This type of capability would ultimately be necessary.

An alternative approach, more consistent with the current market design, would be to provide Verve a single opportunity to submit a simple price-quantity portfolio curve late in the scheduling day (at the same time as IPPs are able to submit balancing offers/ bids). This would:

- Provide a simple basis for enabling other Market Participants to participate in balancing by establishing a balancing merit order in which they could participate without limiting the size of submissions.
- Provide a simple market-based means for setting the balancing price.

- Internalise the risks of price-dispatch inconsistencies to Verve as now, providing flexibility to manage commitment decisions and respond to balancing requirements.
- Avoid the need, and effort, to update offers/ bids so as to manage unit commitment and fuel constraints.
- Improve transparency around the dispatch process and a clean marginal balancing price.

Other points of note under this approach are that:

- Verve would require no additional resourcing, being able to apply its current approach to producing a supply curve.
- Ongoing System Management and IMO resourcing requirements should be minimal.
- IPPs not wishing to participate in balancing would continue to submit balancing prices as now and if dispatched for system security purposes would be paid for out-of-merit operation (the difference between their pay as bid price and the balancing price).

The approach does not preclude some of the default balancer's facilities being treated on a standalone basis or moving towards facility based offers, with some flexibility to revise, as capabilities and experience grow. Indeed, in time this may be the next logical next step.

The following table compares three generic options – complex by facility; simple by facility; and hybrid (simple portfolio/ facility).

Table 2: Assessment of generic options

Criteria		Complex facility	Simple facility	Simple portfolio/ facility
Cost/ time to implement	Verve capable?	Yes	Need to develop	Yes
	SM capable?	No	With some effort	With minimal effort
	IPP capable?	Yes	Yes	Yes
	Market system requirements?	Complex market software	Depends on gate closure/ rebidding flexibility	Minimal
	Rule changes?	Significant	Significant	Minimal
Efficiency gains	Transparency?	Less	Yes	Yes
	Pricing?	Yes	In principle	Better than now

Criteria		Complex facility	Simple facility	Simple portfolio/ facility
	Commitment?	Yes	Yes with rebidding flexibility	Yes subject to dispatch/ price disconnects
	Ongoing resourcing implications?	SM systems/ resourcing	Rebidding capabilities	Minimal
	Operational vs status quo?	Better	Uncertain	Better
Consistent with long term possibilities	SM/Verve separation?	Yes	Yes	Yes
	Constrained grid?	Yes, with appropriate market clearing software	Yes, with appropriate market clearing software	More difficult (but better than the status quo)

5 HYBRID OPTION

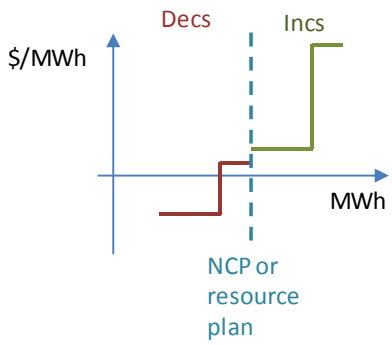
The hybrid (simple portfolio/facility) arrangement outlined above would operate as follows.

STEM/ resource plans/ dispatch plan

- The bilateral submissions and STEM process would operate as now.
- IPPs would submit resource plans as now.
- System Management would prepare the initial Verve dispatch plan as now (taking account of resource plans, wind/ demand forecasts and Verve guidelines).
- A balancing price forecast would be prepared using STEM supply curves (assuming *all IPPs* in the curve and Verve are available for dispatch), resource plans and the latest operational load and wind forecasts. i.e. in effect, treat the following participant balancing submissions as revised offers following the market forecast.

Balancing submissions

- Late in the afternoon, Market Participants would make balancing price submissions.
- IPP balancing submissions would be by facility:
    - Offers/ bids relative to facility resource plans (or gross offers for a facility not in service) ideally by interval along the following lines:



- All IPPs would submit balancing prices, as now, with prices reflecting willingness to participate in normal balancing or otherwise.

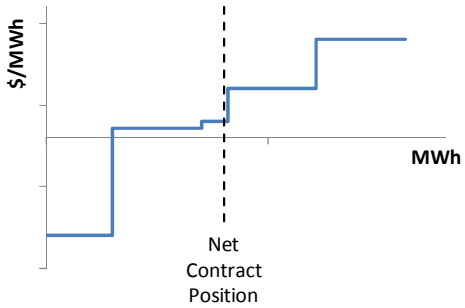
- Half-hourly price-quantity submissions would be desirable to maximise flexibility to participate. One suggestion has been to use peak and off-peak supply increase and decrease prices in IPP balancing submissions. While this looks appealing, it is likely to be limited in terms of the level of competition achievable and changes to the Market Rules and IT systems would be likely required. For example, so that IPPs can limit the amount they are offering for balancing purposes (assuming they would wish to price that portion of capacity at less than the remainder, which must be available for emergency dispatch by System Management.

- Verve's submission would be by portfolio for each trading interval:

  - Verve would submit its full supply curve (as now for its STEM supply curve submission). Initially, the existing STEM submission could be used if that would enable quicker implementation.

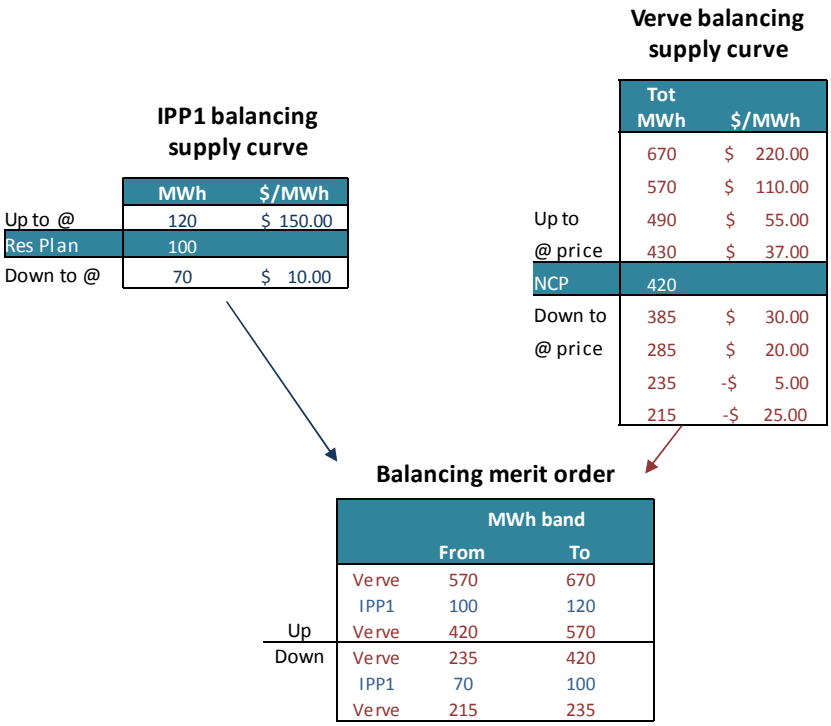
Balancing merit order

- The IMO would create balancing offers and bids from the Verve supply curve with reference to its NCP as illustrated below:



- The IMO would combine all offers and bids to establish the balancing (dispatch) merit order for each trading interval.

  - For example:



Scheduling and dispatch

- IPPs would operate to resource plans unless dispatched off plan by System Management (as now).
- System Management would schedule Verve facilities as now in accordance with the Verve guidelines (rescheduling if need be to remain within the guidelines, to account for IPPs in the balancing merit order and/ or for system security purposes).
- System Management would use the balancing merit order to the extent practical for dispatch purposes (noting discretion for system security purposes). This would involve:
    - Determining when a balancing dispatch instruction is necessary (e.g. by observing when the frequency regulation/ load approaches limits or is expected to).
    - Monitoring the Verve loss adjusted quantity in real time.
    - Dispatching any IPP quantities (or separately offered Verve facilities) at break points specified in the balancing merit order. With reference to earlier discussion, IPPs will need to manage constraints extending beyond a trading interval through their offers and bids rather than expecting inter-temporal trade-offs to be made by the IMO, in preparing the merit order, or System Management, in formulating dispatch instructions. Otherwise new market software would be required.

- Dispatching Verve facilities, in accordance with the Verve guidelines, until an IPP offer or bid break point in the merit order is reached (or a standalone Verve facility). This will at times involve trade-offs in selecting which Verve facilities to dispatch around IPP break points given inter-temporal factors, although similar to the current situation.

Balancing settlements

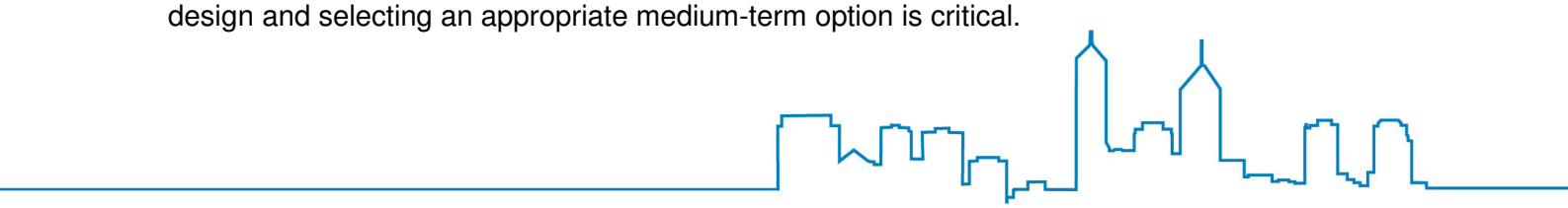
- System Management would advise the IMO of any IPP quantities it has dispatched (to identify the marginal quantity, establish the marginal price, identify any out of merit dispatch and establish authorised deviations).
- IPPs that were dispatched above their resource plans by System Management (authorised) would receive the marginal balancing price (or out of merit payment if necessary).
- IPPs that were dispatched below their resource plans by System Management (authorised) would pay the marginal balancing price (or an out of merit payment if necessary).
- Verve would be paid/ pay on the same basis for quantities above/ below its NCP.
- IPPs with unauthorised deviations would face the marginal balancing price (i.e. no UDAP/DDAP) for the deviations but be required to provide bona fide reasons for compliance purposes.

6 WIDER CONSIDERATIONS

The Market is facilitated by a framework of Market Rules, IT Systems and supporting documentation. The Market Rules themselves represent a complex system of inter-linkages and dependencies.

Remembering that part of the primary considerations of the IMO will be in deciding where the market should be, what level of competition is achievable in a 3-5 year timeframe, and how far the market can reasonably be expected to evolve in this period. The IMO Board has expressed a clear requirement to see material outcomes produced by the RDIWG and through the MEP process.

Any solution adopted is likely to require some level of change to the Market Rules and its supporting systems. In reality, this will involve at least 6 – 9 months to implement – even for the smallest of changes. There will be limited opportunity to revisit the balancing market design and selecting an appropriate medium-term option is critical.



7 CONCLUSIONS

Any mechanism to introduce competitive balancing within the current market design will involve difficult trade-offs and limitations. There are also tensions between the desire to introduce competition quickly and maximising the current opportunity to enhance the market. This includes the desirability of planning market system/IT upgrades in a way that maximises their usefulness and thereby their lifetime (as opposed to adopting a piece meal and likely more expensive IT development path). Similar arguments apply in relation to rule changes. Any option will involve rule changes which will inevitably take some time to design in detail, noting many inter-linkages with market systems/IT requirements and vice versa, and progress through the regulatory process[5]. Finally, there is also a strategic need to look forward over the next few years as to where the market should evolve.

The simple portfolio based approach developed in this paper is a practical means of creating a balancing merit order in which all Market Participants can participate and be dispatched. While having limitations, represents a significant enhancement compared to the status quo. However, it is unlikely to be a sustainable long term design. On the other hand, while facility based bidding and dispatch for all participants including the default balancer would be a more sustainable design option, this would be more challenging to implement, particularly for System Management and the default balancer.

A strategic approach would therefore be to implement the simple portfolio/facilty hybrid approach in a manner that enables the market to transition to a full facility based regime. The hybrid proposal will require half hourly offer/ bid submission systems to be established for IPPs, which could be also used by Verve in future (or for some standalone facilities in the hybrid design). Further, given that, flexibility for revising offers/ bids could be added – even if dormant for the time being. It is likely though that this flexibility would be useful for IPPs anyway.

8 RECOMMENDATIONS

The IMO recommends that the RDIWG:

1. **Note** that there are a number of potential options for enabling greater competition in the provision of balancing within the current market design, each involving limitations and trade-offs;

[5] Any change to the market design where the goal is to implement a robust and effective solution will require:

- Market Rule changes (1 – 3 month process to develop and a 4 - 5 month change process once the rule changes have been developed);
- IT System Changes (IMO, System Management and Market Participant) (3 – 6 months with some overlap with the Rule Change Process); and
- Support system and documentation changes (concurrent changes).

Even when progressing relatively simple solutions, the timeframe can range from 8 – 14 months.

2. **Note** that without the ability to renominate, the option of a facility based simple price-quantity bidding structure for all participants seems likely to be inefficient, if not infeasible for the default balancer;

3. **Note** that the option of a facility based complex bidding structure for all participants would minimise the need for rebidding flexibility but would be a significant change to the current market design, including the need for sophisticated market clearing software;

4. **Note** that the simple hybrid approach is a relatively simple and low cost means of implementing competitive balancing, not a sustainable long term option given limitations;

5. **Note** that a longer term strategic view is called for given that any option will take a significant amount of time to advance through the detailed design and rule change process and there is a coincident opportunity to maximise the value of planned IT system upgrades;

6. **Note** that full facility based options would require significant changes to SM and Verve systems and capabilities.

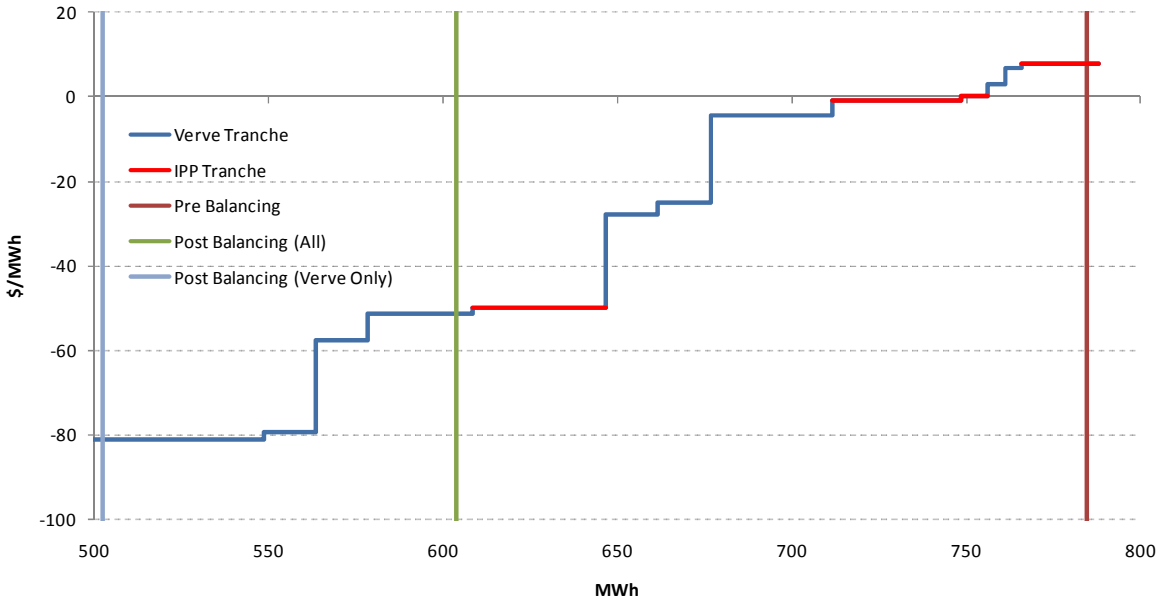
7. **Agree** that it is appropriate to move to a full facility based regime within the next three to five years and a simple hybrid approach to competitive balancing is a reasonable transition pathway.

Appendix 1: INDICATIVE GENERATION COST SAVINGS

A model was developed to consider potential generation costs relating to balancing over the year ending September 2010 with balancing performed by Verve only compared to all Market Participants being involved. The model assumes (hypothetically) that IPP quantities in the aggregate market supply curve (from STEM submissions) would have been available for dispatch at the prices submitted assuming the curve represents as balancing merit order.

Figure 4 shows an example of an interval with (theoretically) very high potential savings. It was a low demand overnight period when Verve facilities priced at -ve $80 per MWh were dispatched down. The model assumes that the IPP tranches could have been dispatched down instead. In practice whether that would have occurred is uncertain, for example if de-commitments would have been involved.

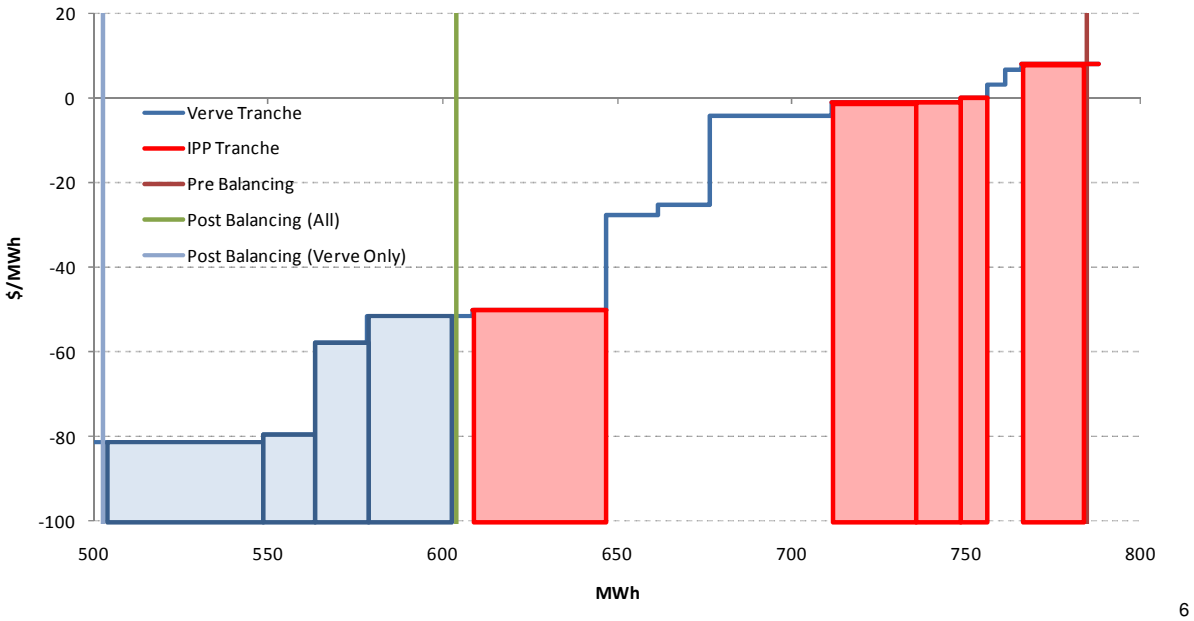
Figure 4: Example of IPPs in supply curve



The red rectangles in Figure 5 represent the cost that could have been avoided the IPPs tranches had been dispatched. The blue rectangles represent what actually happened with only Verve providing balancing. The difference between the two sets of rectangles is the potential savings. In this case it is represents about $5,000 of avoided costs for the interval.

There is also a third category of tranches (costs) which are not shown as rectangles as they would been used in both scenarios and have no effect on the calculation.

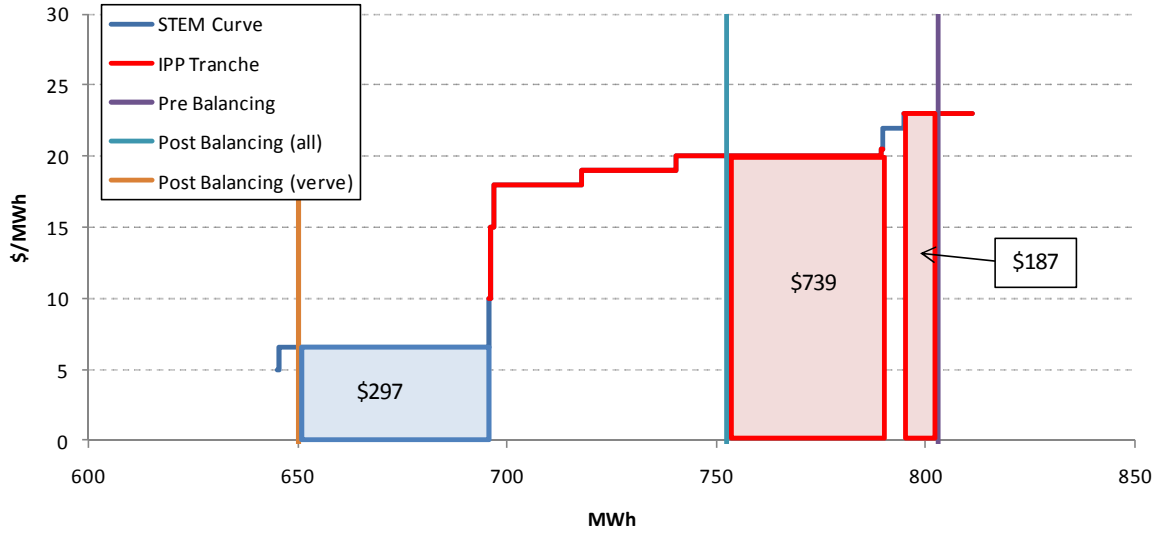
Figure 5: Estimating cost savings



[6]

Figure 6 shows a more typical period. As above, Verve was required to balance downwards and there were other Market Participant tranches that, had SM been able to dispatch them would have avoided costs. The total potential savings were about $630 (the sum of the red rectangles less the sum of the blue rectangles[7].

Figure 6: More typical example

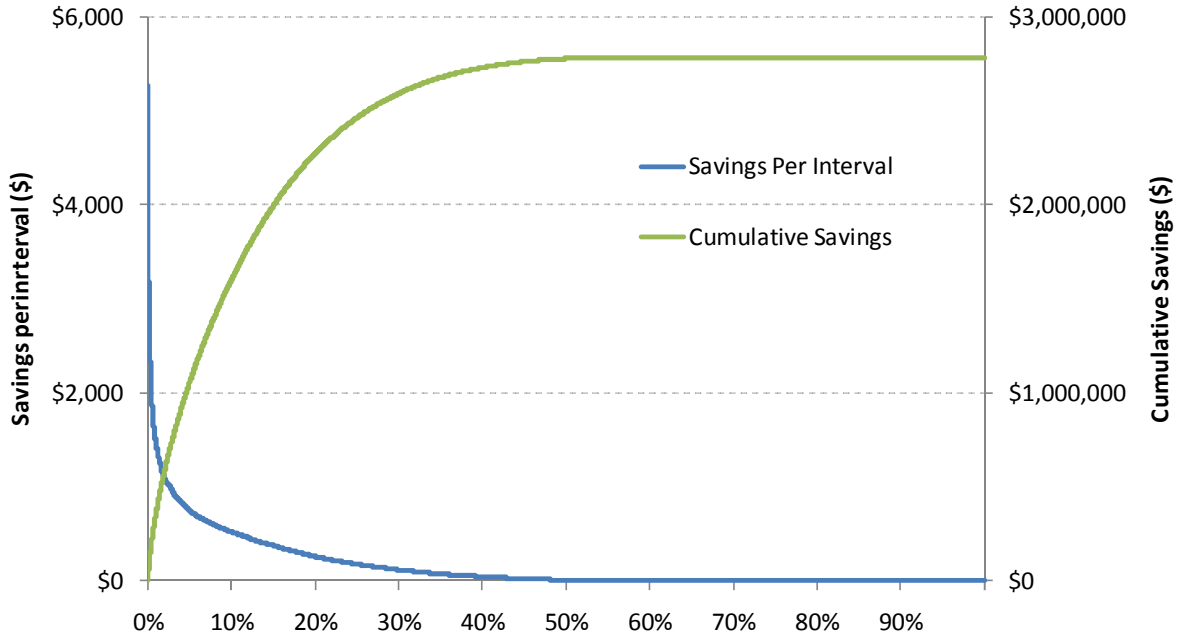


[6] The rectangle bases are at –ve $100/MWh not $0/MWh (as shown for display purposes). The differences are still the same though.

[7] $739+$187-$297 = $629

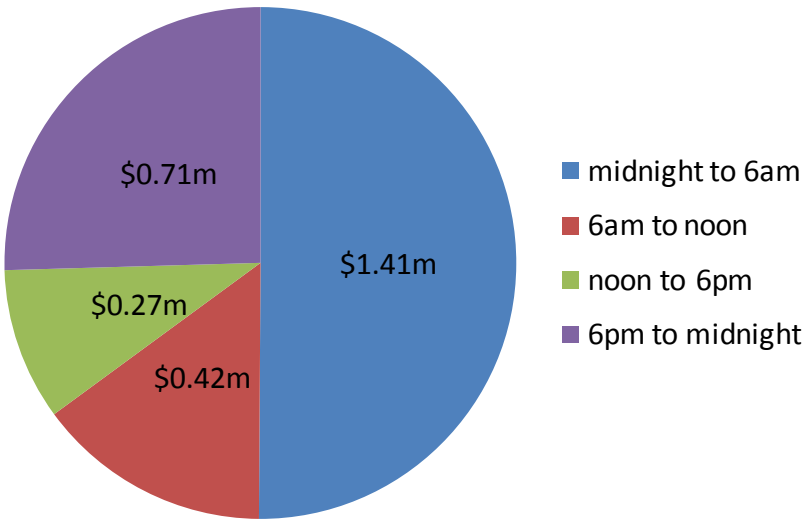
The majority of theoretical savings occurred in a relatively small number of intervals as indicated in Figure 7. For about 50% of the time there are no potential savings, and half of all potential savings would have occurred in only 10% of periods.

Figure 7: Summary of potential savings.



These periods typically occur between the hours of midnight and 6am when demand on the system is low.

Figure 8: Summary by timeframes



Given a range of uncertainties about the actual availability of IPPs for dispatch, care is needed not to overstate the potential savings. However, a figure of around $1m per annum would appear to be conservative.

Load Following Ancillary Service

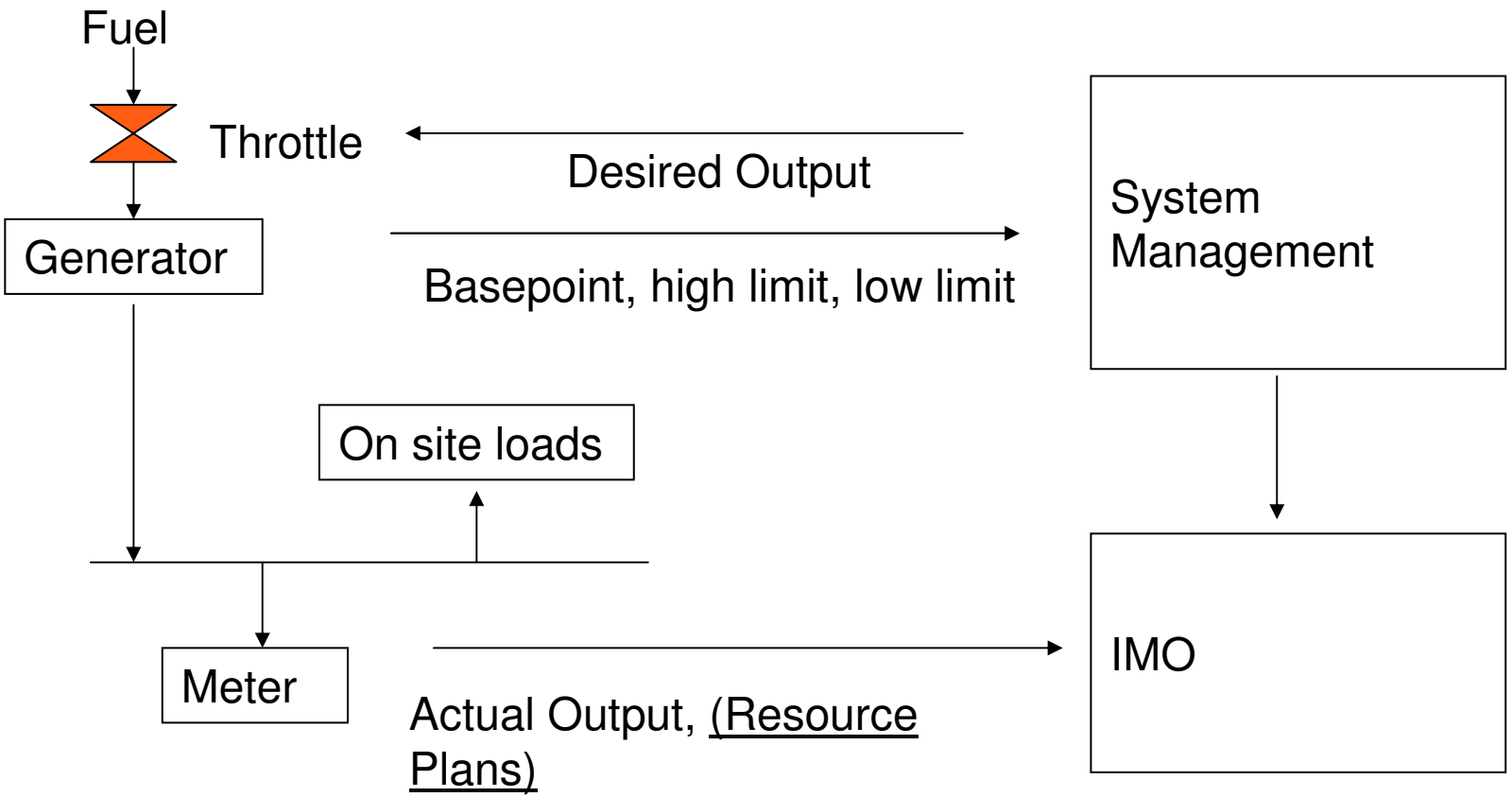
Day Ahead Market

RDI WG 23 November 2010

Service Definition

- Load Following Ancillary Service (LFAS) is a service to match generation and scheduled generator demand (load net of wind), minute by minute, in order to maintain frequency standards
- LFAS is supplied by allowing System Management (SM) to deviate upward and downward a scheduled generator output or dispatchable load demand continuously
- Service provision necessitates having scheduled generator/dispatchable load under Automatic Generation Control (AGC) and ramp rates >= +/-1MW/minute continuously (no breakpoints or no go zones)

Service Definition - 2



Partial competitive procurement

- Small tranche offered open to competitive process initially two blocks of +/- 10MW of total of +/- 60MW
- Two offers will be selected, which may be from the same facility/participant
- Non-discriminatory - all parties including Verve may bid.
- Options for interval / on peak-off peak / day pricing considered – preference for on peak-off peak
- Pay as bid or single marginal price options to be considered – preference for pay as bid

Issues considered when formulating proposal

- Reserve Capacity Obligation interaction
- Resource Plan Interactions. E.g. can not be offered if not synchronised
- Energy Imbalance payments/settlement
- Compliance provisions/penalties
- Changes to systems/software
- Verve or Non-Verve providers market power

Framework - 1

- Prospective Service Suppliers seek accreditation of Facilities to be service provider – need to demonstrate AGC capability to SM
- No price linkage to MCAP/Margin Peak/Margin Off Peak. (not related to Verve Costs). *(needs rule change)*
- Both Verve and Non-Verve offers accepted.
- If no offers, then Verve as provider of last resort is scheduled , in addition to 40MW, as per the current scheme
- Price Offers are made after Net Contract Positions (Bilateral and STEM) are established and at the same time as Non-Verve Resource Plans are submitted. Offers made at 13:00 on scheduling day – *No effect on Reserve Capacity Obligation*

Framework - 2

- Non-Verve providers can only offer for trading intervals with respect to resource plan synchronisation times – *Resource Plan Interaction, (also headroom and floorspace)* SM checks offers against Resource Plans for Non-Verve providers to validate
- Price Offers are on a facility basis, as tolerances are adjusted with respect to Resource Plans (Non Verve only, Verve only valid in settlement if AGC units running)

Framework - 3

- SM schedules LFAS based on lowest conforming offer. Offers accepted/published 15:00 on scheduling day
- Participant hands over control of facility to SM in realtime for trading intervals offered
- No punitive pricing for non compliance (no multipliers if not following dispatch points) – LFAS payment reduced
- Non compliance results in offers not being accepted into the future

Detailed Conditions of Offer

- LFAS dispatch is current implemented by manual scheduling so must be simple and not time consuming for system controller
- A quantity block of +/-10MW is offered for a particular facility. Multiple offers can be made by a Participant who makes more than one facility
- A symmetrical quantity is required e.g + 10 MW above to -10MW below base point (normally= resource plan). +0 - -20MW not equivalent as it means other facilities have to provide the opposite service.
- A minimum time is offered, no offers less than a continuous block of 6 hours within the on peak-off peak period

Energy Imbalance

- Payment for LFAS is for allowing SM to vary output between the upper and lower limit
- By its nature there will generally be a deviation away from day ahead plan
- Day ahead plan is resource plan for Non-Verve providers Any energy imbalance seen as authorised deviation for Non-Verve providers by increasing tolerance , that is an additional +10MW tolerance plus an additional -10MW tolerance– settled at MCAP. Note these are metered quantities (not generator terminal).
- Day ahead plan is Net Contract Position for Verve provider – settled at MCAP

Compliance -1

- In realtime participant sends base point and upper and lower limits to SM. Note these are normally generator terminal quantities. SM sends back required output within these limits.
- If fail to handover control in realtime LFAS payment is reduced, possibly to zero e.g. trading intervals that do not have system management control receive 0 payment
- If fail to provide movement or only reduced movement is supplied in realtime LFAS payment is reduce, possibly to zero. Payment is based on trading interval average. Payment is based on minimum of upward and downward range. E.g. +10MW/-8MW receives 80% payment.

Compliance -2

- If dispatch points are not being closely followed then LFAS payment is reduced, possibly to zero. System Management expects actual MW deviation is within 10% of desired MW deviations
- If repeat offender for not following closely then accreditation removed (no longer able to offer) until it can demonstrate AGC following
- If repeat offender for not offering contract quantity/times then not allowed to offer for 2 weeks

Settlement

For each trading month SM advises IMO of

1. Quantity of LFAS for each participant by trading interval (reduces payment to Verve)
2. Cost of LFAS for each participant for trading month (enables payment to participant)
3. Dispatch Volumes advising of trading intervals LFAS dispatched and to what level (10 or 20MW)(enables authorised deviations by changing tolerance) – *needs change to IMO settlement system. Also one extra trading interval to return to resource plan*

Settlement – Verve only

Verve gets two types of payments

1. +/-40MW (more if no bids under new scheme) under existing scheme, calculated by MCAP and Margin Peak/Off Peak
2. Up to +/-20MW under new scheme, calculated as offered by Verve

Also Verve facility limits do not set aside the competitive 20MW ancillary service tranche (must offer in STEM)

Market Power

- A Price Cap to be considered as an initial safety net - *Need to monitor Market Power before lifting cap – suggest alternative STEM price so a break even if dispatched down (participant is 5MWh/trading interval short of their resource plan)*
- Preference to be the same for Verve and Non-Verve
- Other postulated variations
  - Differential caps, possibly formulation for Verve
  - If only Verve can bid (because others are not synchronised or not accredited), possibly formulation for Verve

Ops & System Change Resp. -1

- Change interface to accept price offers – IMO
- Change interface to submit price offers – Participant
- Validate price offer with resource plan – IMO
- Calculate winning price offer – IMO
- Change interface to advise winning offers – (IMO)
- Change interface to accept winning offer – Participant

Ops & System Change Resp. -2

- Advise System Management of facility/trading interval –IMO
- Calculate volumes for control service for each trading month (based on PI data and compliance) – SM
- Calculate trading intervals for change to tolerance SM
- Calculate control service costs for each trading month - IMO
- Change Settlement System to accept tolerance changes – IMO

Independent Market Operator

STEM Timelines

Date: 23 November 2010

Contents

Independent Market Operator
Level 3, Governor Stirling Tower
197 St George's Terrace, Perth WA 6000
PO Box 7096, Cloisters Square, Perth WA 6850
Tel. (08) 9254 4300
Fax. (08) 9254 4399
Email: imo@imowa.com.au
Website: www.imowa.com.au

1 BACKGROUND

The Market Rules Design Problem Statement[1] contains the list of design issues which form the scope for the work of the Rules Development Implementation Working Group (RDIWG).

Two of these issues relate to the timing of the events in the Scheduling Day. The relevant issues are:

- The timing of operation and single pass design of STEM may be limiting the ability of the market to achieve efficient operation and cost reflective prices and accordingly creates a barrier for participation by all parties; and
- Poorly aligned gas and electricity mechanisms inhibits flexibility to respond to changing circumstances and produces suboptimal outcomes in the WEM.

The IMO has investigated, on behalf of the Rules Development Implementation Working Group (RDIWG), the potential of moving the Scheduling Day timeline in order for participants to:

- be able to make use of later, more accurate weather forecasts from the Bureau of Meteorology (BoM) in the development of their load forecasts and nominations; and
- be notified of their daily gas imbalances prior to the closure of the STEM Submission window, to allow them to manage these gas imbalances more effectively.

In its initial analysis, the IMO has focussed its attention on two areas:

- an investigation into the operational feasibility of shifting the main events of the Scheduling Day into the afternoon; and
- an assessment of the extent to which load forecasts are improved by using the 12.15 pm BoM forecast instead of the 7.00 am BoM forecast.

1.1 Perceived Benefits

RDIWG members have identified several potential benefits to be gained from shifting the main events of the Scheduling Day until the afternoon. These include:

- improvements to MCAP forecasts;
- more accurate bilateral nominations;
- more accurate STEM submissions (price and quantity);
- more accurate calculation of balancing requirements (Verve Energy commitment and dispatch);
- a reduction in Synergy's forecasting error; and
- IPPs knowing their gas position before the closure of the STEM window, resulting in less risk.

[1] Available: www.imowa.com.au/RDIWG

Most of these benefits are dependent on the extent to which the accuracy of load forecasts can be improved by using the 12.15 pm BoM forecast rather than the 7.00 am BoM forecast as an input.

Perceptions of the benefits in terms of better alignment with the gas market were mixed. Most participants were either neutral (no real impact on their operations) or negative (concerned about staffing impacts and the need to re-negotiate contracts). One participant considered that on some occasions it would be of significant benefit to know their gas imbalances before the close of the STEM submission window, but other participants did not consider that this was an important issue for them.

A key concern for participants was that the analysis is done to confirm the benefits of moving the timeline closer to real time. While most participants agreed that a timeline change is feasible and that they could work around the changes, they wished to be convinced of the benefits to the market before any major redesigns are implemented. Some participants questioned whether the forecast issue was significant to the entire market or whether this was important to some participants more than others.

2 WINDOW SUBMISSION ANALYSIS

Initial discussions (outlined in section 4 of this paper) with Market Participants uncovered a number of constraints to moving the Scheduling Day timeline into the afternoon. Assuming that the BoM forecast can be published at 12.00 pm, and given the participant's constraints, the scheduling timeline would follow through until almost 5.00 pm on the Scheduling Day. This is not satisfactory for participants, and so work has been undertaken to understand the submission behaviour of participants and whether the current windows can be shortened to complete the work well before 5.00 pm.

The data analysis focussed on the submission times for the STEM and Resource Plan Submission windows and how promptly Market Participants are able to make their submissions. It was expected that if historical participant behaviour showed a large proportion of submissions being made early in each timeframe, there could be evidential support to change the length of the submission period. The analysis does not support this hypothesis.

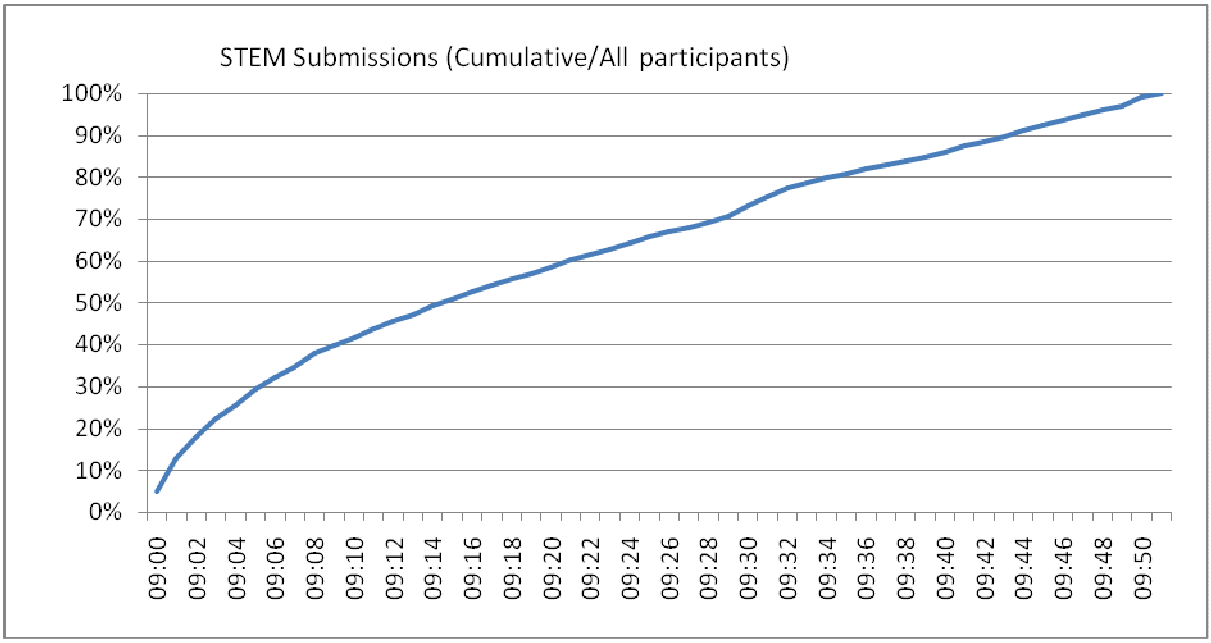


Figure 1 – Cumulative distribution of STEM submisions for all participants

Figure 1 represents the STEM submission patterns of Market Participants. The 95th percentile is at the 46th minute of the 50 minute window. This confirms that, despite the automatic submissions made at the start of the window, participants are using the entire window to finalise their bids.

A similar analysis was conducted for Resource Plans. Figure 2 shows submission behaviour for the Resource Plan Submission window. Currently Market Participants are using the entire 110 minutes to make their submissions, with the 95th percentile at 104 minutes.

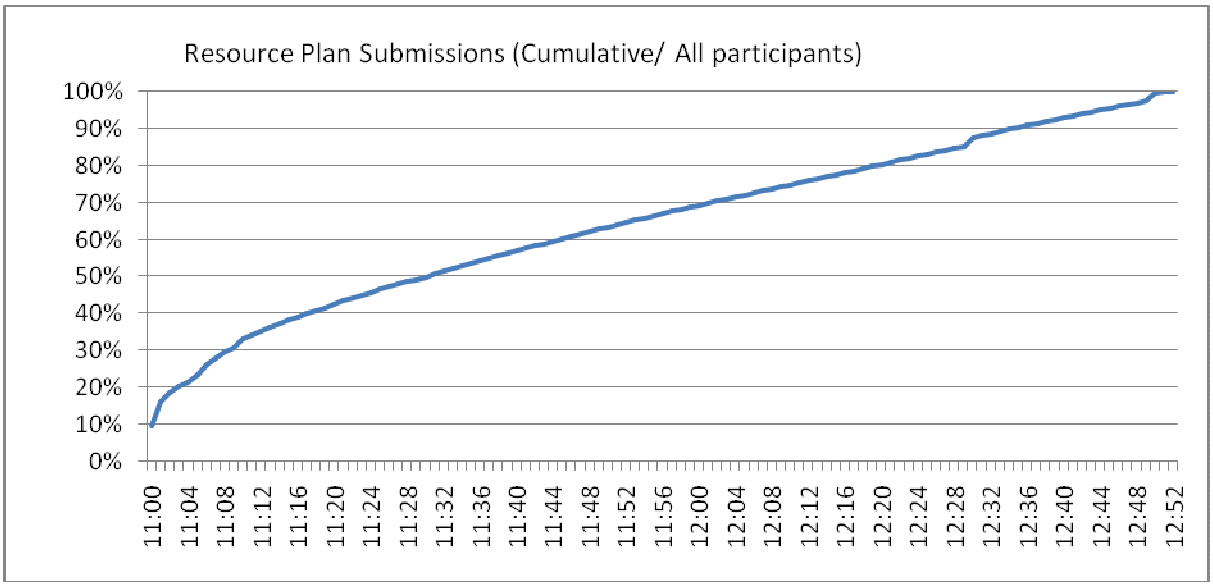


Figure 2 – Cumulative distribution of Resource Plan submissions – for all participants

The results showed that for both windows, Market Participants are currently using the entire window to make their submissions. For the STEM Submission window the trend appears to be across the board (all Market Participants) while for the Resource Plan Submission window some Market Participants are taking significantly longer than others to make their submissions.

It appears that moving the Scheduling Day timeline to the afternoon is not a simple exercise. A move to the afternoon would require significant shortening of the STEM and RP windows and this would require substantial effort from both the IMO and participants to understand how they can deliver the submissions within a shortened timeframe.

3 LOAD FORECAST ANALYSIS

In order to gain an understanding of the potential benefits, the IMO undertook an analysis of the accuracy of the load forecasts provided by System Management to the IMO at 7.30 am and 1.30 pm each day, and of the improvement in accuracy of the latter forecast over the former. The IMO was unable to undertake a similar analysis of Synergy's demand forecasting, since Synergy does not generate demand forecasts using the later BoM forecasts and so was unable to provide the necessary data. However, the IMO did review Synergy's current effective load forecasting performance by comparing its historical Net Contract Position with its actual consumption.

The analysis covered the Trading Days from 1 January 2009 to 31 May 2010 inclusive (note this includes two summer periods). Three Trading Days (23 February 2009 and 8-9 March 2010) were removed from the analysis due to missing or suspect data[2].

The accuracy and bias of the System Management morning, System Management afternoon and Synergy morning forecasts were calculated using a variety of common measures. Definitions of the measures used are available in Appendix 1 of this paper. A summary of the results for the System Management forecasts is provided in the following table.

Measure	SM AM Forecast	SM PM Forecast
Root Mean Square Error (RMSE)	62.13	60.65
Percentage RMSE	6.35	6.19
Mean Absolute Deviation (MAD)	44.96	43.64
Percentage MAD	4.59	4.46
Mean Absolute Percentage Error (MAPE)	4.46	4.34
Alt MAPE (weighted by MWh)*	4.59	4.46
MCAP Alt MAPE (weighted by MWh & MCAP)	4.50	4.30
Mean Percentage Bias (MPB)	-2.95	-2.93
Bias Direction	-66.23	-67.36

[2] No afternoon forecast data was available for 23 February 2009. Data for 8-9 March 2010 was removed as spurious – the morning and afternoon forecasts for 8 March 2010 were identical, and the morning forecast errors for 9 March 2010 were extremely large.

For System Management's forecasts, most of the measures used indicated an average forecasting error of around 4.5%, with the afternoon forecast error very slightly less than the morning forecast error. Synergy's forecast error was slightly larger (around 5.5%) but this is not unexpected since a greater proportion of Synergy's load is temperature dependent. The Mean Percentage Bias (MPB) and Bias Direction values indicate that on average both System Management and Synergy tend to slightly overestimate their load requirements.

The absolute errors of the System Management afternoon forecasts were subtracted from the absolute errors of the System Management morning forecasts, to give a measure of the MWh forecast improvement for each Trading Interval. The resulting values are displayed in Figure 3 below. Note that a positive value indicates that the afternoon forecast was more accurate than the morning forecast, while a negative value indicates the reverse.

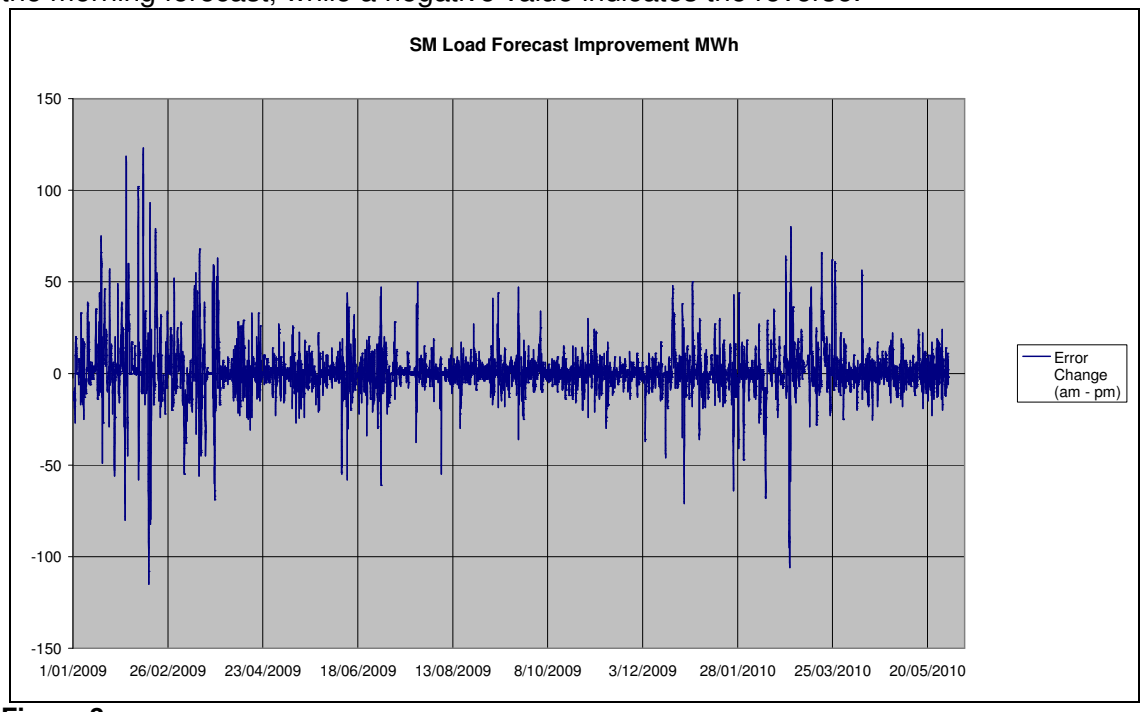


Figure 3

In summary:

- the average improvement per Trading Interval over the 17 month period was approximately 1.32 MWh;
- the average reduction in forecasting error was approximately 2 - 5% (depending on the error measure used);
- in 1% of Trading Intervals the forecast improvement was <= -41 MWh (i.e. the afternoon forecast was at least 41 MWh further from the actual load than the morning forecast);
- in 1% of Trading Intervals the forecast improvement was >= 48 MWh (i.e. the afternoon forecast was at least 48 MWh closer to the actual load than the morning forecast);
- the maximum forecast improvement for a Trading Interval was 123 MWh; and
- the maximum increase in forecasting error for a Trading Interval was 115 MWh.

The results indicate that while the forecasts generated by System Management in the morning are on average more accurate than the forecasts generated in the afternoon, the effective difference is small, even when the errors are weighted by actual load size or MCAP (e.g. the modified MAPE shows a reduction from approximately 4.5% to 4.3%, a improvement of about 4.5%).

The results do not provide any material evidence that a significant improvement in forecast accuracy would be expected by simply moving the scheduling timeline to the afternoon. From the Mean Percentage Bias and Bias Direction values, it appears that for System Management at least it might be possible to produce a more significant improvement in forecast accuracy by investigating the reasons why the forecast model is tending to overestimate load requirements.

4 STAKEHOLDER DISCUSSIONS

The IMO held a series of discussions with stakeholders to gain a better understanding of the opportunities and constraints around a change to the Scheduling Day timeline. A summary of the key findings is provided below.

4.1. Bureau of Meteorology

Discussions with the BoM indicate that a forecast based on the 11.30 am policy update could be provided to System Management and Synergy by 12.00 pm on the Scheduling Day. The IMO has asked the BoM to consider the extent to which it could provide a forecast earlier than this time that would be significantly more accurate than the current 7.00 am forecast.

4.2. IMO Market Operations/IT

The IMO reviewed its Scheduling Day activities to identify how it could support the proposed timeline shift by reducing processing times or opening submission windows earlier. The main outcomes of this review are summarised below.

- The STEM Submission window could be opened earlier (i.e. well before the close of the Bilateral Submission window) without difficulty, reducing the risk to Market Participants of failing to make a submission due to technical issues.
- There appears to be no advantage in opening the Resource Plan and Balancing Data Submission windows earlier, since most Market Participants need the results of the STEM Auction before they can construct their Resource Plans.
- The existing 10 minute interval between the close of the Bilateral Submission window (at 8.50 am) and the publication of various reports at 9.00 am is fully utilised and cannot be reduced.
- The results of the STEM auction could be published (and the Resource Plan Submission window opened) 20 minutes after the close of the STEM Submission window. However, the required processing time may increase if there is a move to Facility based bidding.
- Resource Plans and Dispatch Merit Orders could be provided to System Management within about 10 minutes of the close of the Resource Plan and Balancing Data Submission windows.

- Market Operations expressed some concerns about reducing the length of the STEM Submission window, due to the time it can occasionally take to analyse and resolve technical issues that prevent a Market Participant from making its STEM submission.

4.3. System Management

In its discussions with the IMO System Management provided the following information.

- System Management can generate a load forecast within about 5 minutes of receiving the input BoM forecast.
- System Management could provide the IMO with the ex-ante outage file (currently due by 8.30 am on the Scheduling Day) whenever the market needed. However, the earlier the delivery the more time Market Participants would have to consider their approved outages before the closure of the STEM submission window, while later delivery would allow more time for late approvals to be included in the file sent to the IMO.
- The generation of Ancillary Services estimates is an automated process that takes less than 5 minutes. The estimates are calculated using a load forecast as input, and so System Management would prefer to use as late a load forecast as possible. However, if necessary the estimates could be generated using an earlier forecast.
- It is expected that any new submission windows relating to competitive bidding for Ancillary Services would occur after the Resource Plan submission window.
- The initial Dispatch Plan sent to Verve Energy by 12:30 pm on the Scheduling Day is of limited use, as System Management does not know the expected Independent Power Producer (IPP) generation for the Trading Day when the plan is generated. Useful initial Dispatch Plans could be generated if System Management was aware of the expected IPP generation (on a portfolio basis) for the Trading Day at the time.
- A delay in the provision of Resource Plans and Dispatch Merit Orders until after 4.00 pm could lead to issues for System Management around the availability of the SSOC. The SSOC is usually unavailable between 4.00 pm and 8.00 pm as he is managing the system for evening peak dispatch. His involvement is required for gas nominations and he also is needed to plan for dispatch the following day.

4.4. Market Participants

Discussions were held with a number of Market Participants to better understand their requirements and issues around a modified Scheduling Day timeline. In particular, the IMO sought to understand how the processes and dependencies for the three submission windows (Bilateral, STEM and Resource Plan) varied among Market Participants.

The key requirements, constraints and issues identified by Market Participants are summarised below.

- Synergy considered that the Bilateral Submission window must close no earlier than 95 minutes after the publication of the BoM forecast. This would allow Synergy time to produce its demand forecast and send its final nominations to its bilateral generators 30 minutes before the close of the submission window. However, this outcome is dependent on contract re-negotiations, and if these were unsuccessful then Synergy would propose to extend this timeframe by another 30 minutes.

- There was general support for the earlier opening of the STEM Submission window, in order to reduce the risk to Market Participants of failing to make a submission due to technical problems.
- As a minimum, Market Participants require the STEM Submission window to close no earlier than 50 minutes after the publication of the load forecast and 30 minutes after the closure of the Bilateral Submission window. Several Market Participants stressed the risks of failing to complete their STEM submissions and their reluctance to see any reduction in the length of the window.
- Several IPPs were concerned with any reduction of the current 140 minute window for the calculation and submission of Resource Plans. Some IPPs advised that they frequently use the entire submission window and stressed the potential costs of failing to make a valid Resource Plan Submission.
- For some Market Participants, any change in the timelines will require significant re-negotiation of contracts to ensure that the timelines can be met.
- Several Market Participants raised concerns about IT upgrade costs and resourcing issues. It is common for electricity trading (in the morning) and gas trading (in the afternoon) to be managed by the same staff, creating an issue if the key electricity trading activities are moved to the afternoon. Concerns were also raised about the additional costs of extending trading operations into the afternoon/evening.
- Verve Energy expressed concerns about the impacts of receiving their Dispatch Plans and fuel requirements later in the day, and in particular the potential impact on commitment decisions. Verve Energy agreed with System Management that their initial Dispatch Plan was of little use, but that this might be addressed if the expected total IPP generation was known at the time the initial plan was generated.

5 SUMMARY AND CONCLUSIONS

Analysis and investigation has focussed on:

- assessing the ability and willingness of Market Participants to change practices to support the timing change; and
- determining the extent of any material improvement in moving the Scheduling Day timing to the afternoon.

The results of the analysis do not appear to indicate that a material improvement is likely without other changes to the forecasting arrangements. There may be benefit in Synergy's submissions, however it is not clear what market-wide benefit this would produce.

It is also likely that successful improvements to the level of competition in balancing and the provision of clean pricing results would overshadow any improvement by simply changing the timeframes of the current energy market.

More effort could be expended on this issue, however the IMO considers it an appropriate time to consider where further effort should be focussed.

Discussion Points:

- *Should the IMO continue to investigate potential forecasting improvements for either System Management's or Synergy's forecasting processes; or*
- *Should the IMO discontinue this work stream and focus on delivering outcomes in the balancing market work stream.*

6 RECOMMENDATIONS

It is recommended that the RDIWG:

- **Discuss** the options presented in section 3 of this paper with a view to recommending an appropriate course of action.

APPENDIX 1: DEFINITION OF MEASURES USED

Root Mean Square Error (RMSE) =
sqrt(sum(sqr(actual MWh – forecast MWh)) / number of records)

Percentage RMSE =
RMSE * 100 / average(actual MWh)

Mean Absolute Deviation (MAD) =
sum(abs(actual MWh – forecast MWh)) / number of records

Percentage MAD =
MAD * 100 / average(actual MWh)

Mean Absolute Percentage Error (MAPE) =
sum(abs(actual MWh – forecast MWh) / actual MWh) * 100 / number of records

Alt MAPE =
sum(abs(actual MWh – forecast MWh)) * 100 / sum(actual MWh)

MCAP Alt MAPE =
sum(abs((actual MWh – forecast MWh) * MCAP)) * 100 / sum(abs(actual MWh * MCAP))

Mean Percentage Bias (MPB) =
sum((actual MWh – forecast MWh) / actual MWh) * 100 / number of records

Bias Direction =
MPB * 100 / MAPE

RDIWG Action Points

Legend:

Shaded	Shaded action points are actions that have been completed since the last RDIWG meeting.
Unshaded	Unshaded action points are still being progressed.
Missing	Action items missing in sequence have been completed from previous meetings and subsequently removed from log.

#	Action	Responsibility	Meeting arising	Status/Progress
8	The IMO to investigate options for provision of BOM forecasts (including wind forecasts) prior to 12:15 pm.	IMO	2	Initial meeting held with BOM on 29 October 2010. Further effort on this action will be dependent on progression of STEM timing work stream.
11	The IMO to discuss with System Management its requirements for actual wind speed data and progress a Rule Change Proposal to ensure the provision of this data (if appropriate).	IMO/SM	2	Underway. Discussed with System Management 11 November 2010. System Management is summarizing the potential requirements for this. Once complete, an assessment will be made as to whether a Rule Change Proposal is necessary.

#	Action	Responsibility	Meeting arising	Status/Progress
13	The IMO to investigate whether there are any impediments to calculating a forecast MCAP (closer to real time).	IMO	2	Underway.
15	The IMO to investigate the impact on efficient operational practices of the weightings applied to Reserve Capacity refunds and the issue of large refunds being incurred for small downwards deviations, and prepare a discussion paper for presentation to the Working Group.	IMO	2	Underway. Initial presentation made to RDIWG at 11 October 2010 meeting.
17	The IMO to undertake analysis to assess the extent to which load forecasts are improved by using the 12.15 pm BOM forecast instead of the 7.00 am BOM forecast.	IMO	3	Further effort on this action will be dependent on progression of STEM timing work stream.
19	The IMO to investigate with System Management whether wind generation forecasts could be provided to participants at the same time as load forecasts.	IMO	3	
21	The IMO to discuss nomination timelines with the Goldfields and Parmelia gas pipeline operators and investigate options to vary these timelines.	IMO	3	Further effort on this action will be dependent on progression of STEM timing work stream.
22	The IMO to discuss nomination timelines with the major gas suppliers to gain an overview of the current arrangements and investigate options to vary the nomination timelines.	IMO	3	Further effort on this action will be dependent on progression of STEM timing work stream.
23	Working group members representing gentailers to consider the impact of providing gross bilateral submissions and provide their feedback to the IMO.	Gentailer representatives	3	Underway. Alinta has advised that it has started including its own demand in its Bilateral Submissions.
24	The IMO to investigate the impacts of gentailers providing gross bilateral submissions, including the possibility of automatically generating Resource Plans for Market Participants with a single Facility.	IMO	3	Underway.
25	The IMO to undertake further analysis to assess the extent to which MCAP and clean price differences are due to inclusion of IPP offers in the MCAP price curve versus potential inconsistencies between	IMO	3	Complete.

#	Action	Responsibility	Meeting arising	Status/Progress
	the calculation of the Relevant Quantity and quantities in STEM offers, and report back to the RDIWG with its findings.			
28	The IMO to develop skeletal options to support increased participation in balancing, for presentation to the RDIWG at the 2 November 2010 meeting.	IMO	4	Complete. Balancing paper presented at 2 November 2010 Meeting.
29	RDIWG members to email the IMO details of their suggested options to support increased participation in balancing.	All	4	Peter Ryan's suggestion presented at 2 November 2010 meeting.
30	The IMO to investigate with Verve Energy its ability to provide Facility based submissions and Facility based increment and decrement bids (relative to Net Contract Position) for balancing.	IMO	4	Discussions with Verve ongoing.
31	The IMO to investigate options for a more dynamic Capacity Cost Refund mechanism and present its findings to the RDIWG.	IMO	4	
32	The IMO to investigate the original rationale behind the current weightings used for Capacity Cost Refunds, and present its findings to the RDIWG.	IMO	4	
33	The IMO to investigate options for the application of Capacity Cost Refund payments and present its findings to the RDIWG.	IMO	4	Currently on the IMO Rule Change and Issues Log for prioritisation.
34	The IMO to publish the minutes of Meeting No. 4 on the website as final.	IMO	5	Completed.
35	System Management to provide a presentation to RDIWG members at the 23 November 2010 meeting, on the current process for the dispatch of Verve Energy facilities by System Management.	SM	5	System Management to present at 23 November 2010 meeting
36	The IMO to work with System Management and Verve Energy to investigate possibilities for generation of the dispatch plans and balancing offers/bids needed to support a competitive Balancing solution and develop a dispatch-based option for the provision of competitive Balancing and present a proposal to RDIWG members at the 23 November 2010 meeting.	IMO/SM/Verve	5	Paper to be presented at 23 November 2010 meeting.

#	Action	Responsibility	Meeting arising	Status/Progress
37	The IMO to consider whether in the short term it should request Market Participants that do not make STEM supply curve submissions to not submit Resource Plan/Shortfalls and provide the information to System Management separately.	IMO	5	Not completed.
38	The IMO to confirm the MCAP percentages in the handout Jim Truesdale distributed at the end of the meeting.	IMO	5	Completed. A final version of the handout is provided in the appendix to the minutes for Meeting No. 5.
39	RDIWG members to email their comments on the draft Market Evolution Program Summary to the IMO by 5.00pm on Wednesday 10 November 2010.	IMO	5	Underway. Email sent to members on 3 November 2010 requesting comments.
40	The IMO to incorporate the feedback received on the Market Evolution Program Summary and then use as a public reference document for the Program subject to the approval of the IMO Board.	IMO	5	Feedback received from Synergy and the ERA.
41	The IMO to provide RDIWG members with further details on the IMO IT Roadmap, the estimated OPEX impacts of the Market Evolution Program and the estimated impact of the Program on Market Fees.	IMO	5	Underway – will be included in the next edition of MEP Watch.
42	The IMO to offer site presentations to Working Group members and invite Working Group members to participate in the presentations.	IMO	5	Underway.