Independent Market Operator

Reserve Capacity Mechanism Working Group (RCMWG)

Agenda

Meeting No.	7
Location:	IMO Boardroom, Level 17, Governor Stirling Tower, 197 St. Georges Tce, Perth
Date:	Thursday 13 September 2012
Time:	2:00 pm to 5:00 pm

Item	Subject	Responsible	Time
1.	**WELCOME**	**Chair**	2 min
2.	**APOLOGIES / ATTENDANCE**	**IMO**	2 min
3.	**MINUTES FROM MEETING 5** *Note Meeting 6 was cancelled*	**IMO**	10 min
4.	**ACTIONS ARISING**	**IMO**	2 min
5.	**INDIVIDUAL RESERVE CAPACITY REQUIREMENTS (WORK STREAM 4)** *Presentation by Dr Richard Tooth*	**Sapere Research Group**	90 min
6.	**RESERVE CAPACITY FORECASTING METHODOLOGIES** *Presentation by the IMO*	**IMO**	30 min
7.	**MOVING TO A DYNAMIC CAPACITY REFUND REGIME** *Presentation by the Mike Thomas*	**Lantau Group**	30 min
8.	**GENERAL BUSINESS**	**Chair**	5 min

Independent Market Operator

Reserve Capacity Mechanism Working Group

Minutes

Meeting No.	5
Location:	IMO Boardroom Level 3, 197 St Georges Terrace, Perth
Date:	Thursday 12 July 2012
Time:	Commencing at 2.05pm – 5.05pm

Attendees	
Allan Dawson	Chair
Suzanne Frame	IMO
Andrew Sutherland	Market Generator
Brad Huppatz	Market Generator (Verve Energy)
Ben Tan	Market Generator (arrived at 2.20pm)
Shane Cremin	Market Generator
Wendy Ng	Market Customer
Patrick Peake	Market Customer
Steve Gould	Market Customer
John Rhodes	Market Customer (Synergy) (proxy)
Andrew Stevens	Market Customer/Generator
Jeff Renaud	Demand Side Management
Peter Huxtable	Contestable Customer (proxy)
Justin Payne	Contestable Customer
Wana Yang	Observer (Economic Regulation Authority)
Paul Hynch	Observer (Public Utilities Office)
Additional Attendees	
Richard Tooth	Presenter (Sapere Research Group)
Mike Thomas	Presenter (The Lantau Group)
Aditi Varma	Minutes
Fiona Edmonds	Observer
Jenny Laidlaw	Observer
Apologies	
Brendan Clarke	System Management
Stephen MacLean	Market Customer (Synergy)
Geoff Down	Contestable Customer
Wayne Trumble	Observer (Griffin Energy)

KEY DECISIONS REGISTER

A] HARMONISATION OF DEMAND SIDE AND SUPPLY SIDE RESOURCES (WORK STREAM 2)

- *The IMO to relax its requirement for Facilities to have firm fuel supply contracts in place if the capacity refund mechanism is assessed to provide sufficient commercial incentives for Facilities to be available when required.*
- *The revised DSM availability requirements for the 2013 Reserve Capacity Cycle will be as follows:*

Days of Availability	*All Business Days*
Dispatch events per year	*Unlimited*
Hours per day	*6 hours*
Total hours available	*Unlimited*
Earliest Start	*10:00 AM*
Latest Finish	*8:00 PM*
Minimum notice period of dispatch	*2 hours + day before notice (best endeavours) of probable dispatch*

- *All DSPs to provide a telemetry service that enables real time information on availability and performance to be recorded for the 2013 Reserve Capacity Cycle onwards (noting a period of transition to apply for existing DSPs, up to mid-2015)*
- *Remove the 'third-day rule' from the 2013 Reserve Capacity Cycle onwards — whereby a DSP dispatched for a third continuous day is not subject to capacity refunds.*
- *Incorporate into the Market Rules ability for DSP's to be dispatched outside of nominated availability limitations on a best efforts basis (i.e. with no implications for capacity refunds for non-performance).*

B] RESERVE CAPACITY PRICE (WORK STREAM 1)

- *The IMO to include The Lantau Group's proposal into the final list of recommendations. The proposal includes:*
  - *Set the Maximum Reserve Capacity Price at 110% and the slope at -3.25.*
  - *Rename the Maximum Reserve Capacity Price to an expected or a benchmark Reserve Capacity Price.*

Item	Subject	Action
1.	**WELCOME AND APOLOGIES / ATTENDANCE** The Chair opened the fifth meeting of the Reserve Capacity Mechanism (RCM) Working Group (RCMWG) at 2:05pm. The Chair welcomed the members in attendance and noted apologies from Mr Stephen MacLean and Mr Geoff Down. In addition to the apologies he noted that Mr Brendan Clarke was absent and Mr Wayne Trumble was expected to attend the meeting as a requested observer.	
2.	**MINUTES ARISING FROM MEETING 4** The minutes were accepted as a true and accurate record of meeting 4.	
3.	**ACTIONS ARISING** Ms Suzanne Frame noted that work would be ongoing to assess the cost-effectiveness of proposed options for harmonisation of demand side and supply side capacity resources (Action Item 2). With respect to Action Item 7, she noted that the workshop on oversupply of capacity was held on 4 July 2012 and had most members in attendance. The Chair noted his appreciation for the members' participation in the workshop and also thanked Mr Mike Thomas for facilitating it.	
4.	**HARMONISATION OF DEMAND SIDE AND SUPPLY SIDE RESOURCES (WORK STREAM 2)** The Chair invited Dr Richard Tooth to present his paper. The following points of discussion were noted: • On the issue of firm fuel supply contracts, Mr Andrew Sutherland noted his agreement with increased flexibility in providing commercial incentives to improve reliability. He added that there are no force majeure provisions in a gas supply crisis, and that if incidents like Varanus Island or North-West Shelf happened, then generators should not have massive penalties imposed when gas prices are high. Mr Patrick Peake questioned the need for higher commercial incentives when, in his opinion, the capacity refunds are already sufficiently high to ensure adequate supply of fuel. Mr Shane Cremin observed that caution needs to be exercised because with increase in capacity refunds or penalties, incentives also get created to not be available in the first instance. Dr Tooth noted that proposed greater weight being placed on commercial incentives to ensure adequate fuel supplies had an inherent interdependency with the capacity refunds work stream. • On the topic of performance requirements of Demand Side Management (DSM), Mr Jeff Renaud noted his support for the proposals, but he added that the current formula used for capacity refunds for DSM would have to be adjusted when new performance requirements are imposed. He proposed that DSM should be subject to the same capacity refunds table as generators. He noted this streamlining was important as currently DSM can lose a full year's capacity payments via the application of refunds for a total period of 24 hours. He also noted that there could be some benefits in reordering the Dispatch Merit Order. Ms Jenny Laidlaw noted that this had already happened through a Rule Change before	

Item	Subject	Action
	commencement of the Balancing Market. • There was some discussion on how DSM is dispatched to cover the peak. Mr Cremin questioned how individual loads actually respond to a dispatch event- if the dispatch event is for a substantial number of hours, do the loads ramp back up at the end of the event? Mr Renaud responded that within EnerNOCs portfolio, different Demand Side Programmes (DSPs) will tend to be used differently to respond in accordance with the nature of the associated loads comprising that DSP. • Discussion ensued on the flexibility available to System Management to dispatch DSM when they need to if the hours of availability of a DSP are increased to unlimited. Discussion also ensued on telemetry provision from DSM. Members also discussed what impacts they might expect to see if enhanced performance requirements are enforced on DSM. • Mr Ben Tan queried if EnerNOC and WaterCorp would experience a significant reduction in the capacity of their portfolios as a result of the proposed changes. Both Mr Renaud and Mr Huxtable noted that it was difficult to predict at that moment, but that expectations would be that the structure of their DSPs would need to be reviewed and that associated loads that had limited flexibility to respond to the new requirements would exit the market. • The Chair noted that the proposals presented would be recorded as key decisions. • Mr Andy Stevens and Mr Renaud noted that the working group should define the system operating conditions when all DSM should be available for unlimited dispatch. ***Decision Points:*** • *The IMO to relax its requirement for Facilities to have firm fuel supply contracts in place if the capacity refund mechanism is assessed to provide sufficient commercial incentives for Facilities to be available when required.* • *The revised DSM availability requirements for the 2013 Reserve Capacity Cycle will be as follows:*	

Days of Availability	*All Business Days*
Dispatch events per year	*Unlimited*
Hours per day	*6 hours*
Total hours available	*Unlimited*
Earliest Start	*10:00 AM*
Latest Finish	*8:00 PM*
Minimum notice period of dispatch	*2 hours + day before notice (best endeavours) of probable dispatch*

Item	Subject	Action
	• *All DSPs to provide a telemetry service that enables real time information on availability and performance to be recorded for the 2013 Reserve Capacity Cycle onwards (noting a period of transition to apply for existing DSPs, up to mid-2015)* • *Remove the 'third-day rule' from the 2013 Reserve Capacity Cycle onwards — whereby a DSP dispatched for a third continuous day is not subject to capacity refunds.* • *Incorporate into the Market Rules an ability for DSP's to be dispatched outside of nominated availability limitations on a best efforts basis (i.e. with no implications for capacity refunds for non-performance).*	
5	**DYNAMIC RESERVE CAPACITY REFUND REGIME (WORK STREAM 3)** The Chair introduced Mr William Street from the IMO and invited him to present a brief history of the Rule Development Implementation Working Groups (RDIWG) previous deliberations on the development of a dynamic reserve capacity refunds regime. The following points of discussion were noted: • Mr Sutherland noted whilst the concept was considered workable in the RDIWG, the level of refunds themselves was too high. Mr Stevens agreed that the refunds were designed to apply at peak periods rather than at low reserve margin periods, making it a blunt proxy. • Mr John Rhodes noted that the uncertainty of a dynamic capacity refunds would be difficult for a new generator entering the market. He added that Synergy would prefer a fixed refund profile for a new generator transitioning to a dynamic system after having been being commissioned for a year. • The Chair observed that a dynamic capacity refund mechanism comes with a level of uncertainty which would put focus on System Management's outage approvals process. • Mr Brad Huppatz noted Verve Energy's support for the dynamic regime but added that with increasing risk and uncertainty a Market Participant's exposure in the market will increase. • Mr Peake observed that a peaking plant is penalised steeply and unfairly when it is actually dispatched when the forecast is wrong, retailers need to buy from STEM, a generator has broken down or gas is not available. He noted that as refunds increase, the cost of finance for a peaking unit will increase. Unlike larger Market Generators that can spread their losses across a number of facilities in their portfolio, a peaking unit can actually go out of business if it is exposed to very high penalties in the event of a Forced Outage. Mr Shane Cremin supported Mr Peake's point and added that getting the value of available capacity right was quite difficult. He suggested that a potential measure could be the rolling average of a generator's actual performance taking into account the level of Forced or Planned Outages. • Mr Tan asked if outages data would be forecast and published on the IMO's website. Mr Stevens noted that what a generator needs to know is when there is reserve margin available and some level of this information was already available in the market. The Chair observed	

Item	Subject	Action
	that the objective of the current system was to incentivise facilities to be available. Mr Stevens observed that the refund regime did not in itself incentivise a base-load generator to be more available than needed. It was rather a refund that generators would try to avoid by patching up machines to stay online as much as possible rather than taking an outage and fixing them completely. He added that generators would try to do their maintenance to avoid Forced Outages, and bring plant back online to avoid refund. Mr Rhodes noted that that was an appropriate outcome as it means that the market has full capacity and energy prices will be lower. Discussion ensued on why a generator would not take out a Planned Outage when it identifies an issue with the machines. • Mr Mike Thomas observed that there were two issues at hand- one around how sharp the refunds should be for generators to encourage them to solve their problems faster and second, whether it's the right level of refund for that type of problem. He added that in The Lantau Group's previous work, they were trying to assess a balanced approach to measure against expected levels of performance. • Discussion ensued on the differential effects of a dynamic refunds regime on different kinds of generators. Mr Peake noted his concern that a sharper refund regime can potentially put a peaking plant out of business. Mr Sutherland expressed his concern with the effects of high refunds on new, more reliable plants in comparison to old, less reliable plants. • Dr Tooth noted that the main concern for generators seemed to be that there was no creative way to pool their risk effectively. Members discussed what refund multiplier could be considered suitable. The Chair noted that a dynamic refunds regime comes with an inherent uncertainty which would expose smaller generating units to a greater level of commercial risk. He added that the purpose of markets is to provide an enabling environment for businesses to manage their risk and make sound business decisions. • Members discussed the pros and cons of allowing for a certain percentage of Forced Outage rates followed by stricter refunds for non-performance. However, Mr Rhodes observed that Forced Outage rates are accounted for in bilateral contracts and so a retailer should not be paying twice for the cost of Forced Outages. Mr Stevens pointed out that the amount of reserve margin could be considered as a threshold for enforcing high refunds on generators. The Chair noted that dynamic refunds design was a complex issue and that Mr Thomas would be assigned to this work stream. ***Action Point:*** • *The Lantau Group to investigate the options for implementing a dynamic capacity refund mechanism and present to the RCMWG for discussion.*	**The Lantau Group**
6.	**RESERVE CAPACITY PRICE (WORK STREAM 1)** The Chair invited Mr Thomas to present the conclusions from the workshop that took place on 4 July 2012. The following discussion points were noted:	

Item	Subject	Action
	• Mr Sutherland noted that if the steeper slope doesn't incentivise bilateral contracting then there would be a major problem for financing merchant plants. Mr Rhodes agreed that increase in bilateral contracting was an obvious outcome of the steeper slope. • Mr Tan and Mr Stevens reiterated their concerns raised previously with respect to how the steeper slope would stop a retailer coming in and incentivising additional capacity to bring down their portfolio of costs. • Mr Tan questioned if Mr Thomas had considered a floor price on the slope to mirror the cap as financing plants in the future would depend on the financer's expectation of the Maximum Reserve Capacity Price (MRCP). With a huge swing in that price, raising finance would be very difficult. Mr Thomas observed that from a value management perspective, a floor price could be implemented. A suggestion of 50% of MRCP was made. • Mr Tan also questioned if Mr Thomas thought enough had been done already with the change in MRCP. • Mr Rhodes noted that enough evidence had not been shown to say that steepening the slope will produce better outcomes for the market. • Ms Wana Yang noted that she was not convinced that the steeper slope formula would solve the excess capacity problem, as even with the reduction in the price, new capacity had entered the market. She also argued that the current practice of assigning Capacity Credits to any Facility that had received Certified Reserve Capacity creates a shared reserve capacity cost burden on Market Customers. This was an inefficient market outcome which implied that a cap should be implemented on the Shared Reserve Capacity Cost. • General discussion ensued on the pros and cons of assigning Capacity Credits only to the level of the Reserve Capacity Requirement and implementing an auction mechanism. Mr Thomas noted that the steeper slope approach could be considered a transitional short term arrangement that could eventually lead to discussions around an auction mechanism. • The Chair noted that the members agreed that the proposed approach seemed the most efficient and feasible solution in the short term. ***Decision Points:*** • *The IMO to include The Lantau Group's proposal into the final list of recommendations.* • *The IMO to consider adding a floor price to the Reserve Capacity Price.*	 **IMO** **IMO**
	CLOSED The Chair thanked the members and declared the meeting closed at 5.05 pm.	

Independent Market Operator

Reserve Capacity Mechanism Working Group (RCMWG)

Agenda item 4: RCMWG Action Points

Legend:

Shaded	Shaded action points are actions that have been completed since the last RCMWG meeting.
Unshaded	Unshaded action points are still being progressed.

#	Action	Responsibility	Meeting arising	Status/Progress
1	The Lantau Group to investigate the options for implementing a dynamic capacity refund mechanism and present to the RCMWG for discussion.	The Lantau Group	July	In progress
2	The IMO to include information on the cost effectiveness of proposed solutions or harmonisation	IMO	April	In progress

Report for the Independent Market Operator

Individual Reserve Capacity Requirement September – Working Group Meeting

Dr Richard Tooth

31 August 2012

About the Author

Dr Richard Tooth is a Director with the Sydney office of Sapere Research Group. He works on public policy, competition and regulatory issues across a number of industries including water, energy, transport and financial services. Dr Tooth has a PhD in Economics, a Master in Business Administration and a Bachelor of Science.

About Sapere Research Group Limited

Sapere Research Group is one of the largest expert consulting firms in Australasia and a leader in provision of independent economic, forensic accounting and public policy services. Sapere provides independent expert testimony, strategic advisory services, data analytics and other advice to Australasia's private sector corporate clients, major law firms, government agencies, and regulatory bodies.

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Contents

Glossary

DSM	Demand Side Management
DSP	Demand Side Programme
IRCR	Individual Reserve Capacity Requirement
MWh	Megawatt hour
NTDL	Non-temperature dependent load
RCM	Reserve Capacity Mechanism
RCR	Reserve Capacity Requirement
RCMWG	Reserve Capacity Mechanism Working Group
SWIS	South West Interconnected System
TDL	Temperature dependent load
TI	Trading Interval
WEM	Wholesale Electricity Market

Summary

The Individual Reserve Capacity Requirement (IRCR) obligation is a means of allocating the costs of Reserve Capacity Requirement (RCR) to Market Customers.

Currently IRCR obligations are allocated to Market Customers based on the median of metered demand from top 12 Trading Intervals (TIs) taken from previous summer. The relative obligation varies by type of loads, which are classed as:

- Intermittent Loads
- Non-temperature Dependent Loads (NTDLs)
- Temperature Dependent Loads (TDLs), and
- New Meters (which may be NTDLs and TDLs).

Intent of the IRCR method

It is in the interests of the Market that the IRCR allocation is perceived to be fair and equitable. However, the method of allocation is potentially important to the Wholesale Market Objectives.

1. The allocation method can motivate changes in energy use (perhaps the primary intent) that could improve reliability in the short-term, and/or result in a reduced capacity requirement in future Reserve Capacity Cycles. That is, an IRCR allocation (hereafter a "targeted" IRCR) could result in:
   (a) Loads actively reducing demand at peak TIs thereby reducing reliability risk.
   (b) Loads consistently reducing demand during peak TIs so as to reduce the forecasted need for future capacity.
2. Conversely, the allocation method could motivate changes in energy use in ways that do not improve reliability and/or reduce forecast needs. In such case, the changes in energy use may be inefficient as there is no market benefit. This may also distort long-term decisions by providing a relative advantage to Loads that can benefit from the IRCR allocation.
3. An IRCR allocation that is too volatile (i.e. that varies significantly based on small changes) may create unnecessary financial risks for Market Customers. This may also create uncertainty as to the benefits, and thus the incentives, to investing in demand management that is in the interests of the Market.
4. There are administrative costs associated with the allocation process.

There are competing tensions in developing an allocation method that addresses these factors. For example:

- An IRCR calculation that is diluted over too many TIs could fail to motivate customers to reduce demand when desired.
- Conversely, an IRCR calculation that is concentrated on too few TIs may provide incentives for gaming and increase the volatility of the IRCR allocation to the detriment of Market Customers.

Issues and options

Extent to which IRCR meets the economic intent

Ideally the IRCR allocation method would provide incentives for loads to modify energy use to improve reliability and reduce the required level of capacity to be procured. This is potentially achieved by rewarding loads:

- that consume less during peak TIs, and
- with more stable consumption.

The current IRCR allocation broadly achieves this.

The selection of TIs

The selected TIs for IRCR calculation are not necessarily aligned with the peak energy consumption. An issue that could be simply addressed is that the TIs used are selected from days with highest total demand; rather than days with highest peak demand.

The number of TIs used

The Lantau Report raised the concern that too many TIs are used to determine IRCR, thereby diluting incentives to reduce demand at peak times. However a reduction in the number of TIs is not recommended. Using fewer TIs would:

- provide very limited benefit, as in most cases the peak demand TI is only a proxy for the one in 10 year peak demand used for forecasting and is not necessarily closely related to times of peak reliability risk.
- increase the significance of the few TIs selected. This would:
  - increase the volatility of the IRCR allocation by increasing the sensitivity of the IRCR allocation to the TI selected. This creates a financial risk which is difficult for Market Customers to budget and manage. It also could increase the uncertainty of returns from, and thus may deter, investment in efficient demand management.
  - increase the incentives for gaming; that is, increase the incentives for making opportunistic reductions in consumption during IRCR peak TIs that reduce IRCR allocation but are not consistent enough to provide a benefit to the Market.

Some preliminary analysis of load profiles during the two most recent Hot Seasons was undertaken. The preliminary results suggest that there is little evidence of loads responding to the IRCR allocation. The issue of volatility was examined by testing the sensitivity of the IRCR allocation to the TIs selected; this analysis suggested that there no pressing need for change.

The use of the median value

The Lantau Report argued against the use of the median value in the IRCR calculation as it ignores the absolute size of peak values. A further argument against the median is that it does not reward stable output. However, relative to alternatives, the median value has some benefits – it is a simple approach that does help manage the volatility of IRCR allocations.

There are viable alternatives (including a simple average and use of alternative percentile, e.g. 80th rather that the 50th), however there are trade-offs in developing a method that is both simple and accurate.

On balance there are arguments for and against the use of the median value. Although there are alternatives that might be considered, there does not appear to be a pressing case for change.

Allocation of IRCR to Associated Loads

The Lantau Report raised concerns relating to the capacity awarded to Demand Side Programs (DSPs) relative to the IRCR contribution of their Associated Loads.

The performance of a DSP in meeting its capacity obligations is measured against its Relevant Demand (RD). RD is a static measure, which like the IRCR calculation is based on the median values of actual metered output from TIs in the Hot Season. As the IRCR allocation involves a significant uplift on the median values, it would be generally expected that the RD of a DSP should be much less than the contributions to IRCR of the Associated Loads of the DSP.

However, as noted by the Lantau Report, the seemingly illogical result can occur whereby the RD of a DSP, and hence the capacity that the DSP is measured as being capable of delivering, may exceed the contributions to IRCR of the Associated Loads (an amount which incorporates an upwards adjustment over median output during the peak TIs selected).

Such a result may reflect differences in the RD and IRCR calculations. Two important differences are that:

- RD and IRCR use different TIs. In particular, an Associated Load with a low consumption in February relative to the other Hot Season months may have a relatively large contribution to RD compared to the equivalent IRCR calculations.
- The output of loads used for calculating RD may be adjusted following requests for substitution of maintenance intervals from the Market Customer to whom the DSP is registered.

The second difference, creates an opportunity for gaming whereby Associated Loads could opportunistically reduce demand to minimise the IRCR obligation for their relevant Market Customer and then through their DSP's Market Customer (the demand side aggregator) apply for adjustments to maintain a higher RD for the applicable DSP. This issue was previously highlighted in the Rule Change Proposal: Curtailable Loads and Demand Side Programmes (RC_2010_29).

A number of options were considered to address these concerns. An option noted for further consideration is to remove the incentives for gaming by limiting the modifications to load values used in RD calculation to be no more than the comparable IRCR 'contribution to the system peak load'.

There is a separate double counting issue that occurs when DSPs are dispatched during peak TIs selected for IRCR allocations. This could be separately addressed; however, given the low frequency of DSP dispatch the costs may exceed benefits.

Summary of proposals

Proposal 1:

> The peak TIs selected for IRCR calculations are changed to be selected from Trading Days with the highest peak — not daily (i.e. aggregate) — demand.

Proposal 2

> The number of TIs for IRCR calculation is not modified.

Proposal 3

> There is no change to the use of the median value in the IRCR calculation.

Proposal 4

> Consideration is given to limiting the modifications to load values used in the RD calculation whereby the modified RD values cannot exceed the Associated Load's IRCR calculation of "contribution to the system peak load".

Proposal 5

> Consideration is given to adjusting the output of Associated Loads for IRCR calculations when the Associated Load has been dispatched as part of a DSP.

1. Introduction

To fund capacity that is procured through the Reserve Capacity Mechanism (RCM), Market Customers are given an Individual Reserve Capacity Requirement (IRCR) obligation. The IRCR is a quantity of capacity (expressed in MW) which represents that customer's share of the total system capacity requirement load during peak times.

In a 2011 review of the RCM The Lantau Group identified that a number of minor refinements to the calculation of the IRCR are required to mitigate rent seeking behaviours that are being created by the current IRCR settings.

The Reserve Capacity Mechanism Working Group (RCMWG) is now considering the recommendations of The Lantau Group and will be deliberating on the recommendations with respect to the refinements to the IRCR calculation (Work stream 4) during its upcoming meetings.

This report examines the IRCR calculation (see scope of the review in Box 1 overleaf).[1] The rest of this report is structured as follows:

Section 2 provides an overview of the current calculation of IRCR including:

  - Discussion of the context
  - The current calculation

- Section 3 discusses issues and alternatives.

1 In addition to those discussed in this report, a number of other issues/concerns with the current IRCR settings were identified by the author or raised by Market Participants, however these appear to be relatively minor and/or are out of scope.

Box 1: Review requirements

1. Preparation of a brief overview of the current calculation of the IRCR and associated issues, including those identified by The Lantau Group. Note that the consideration of the IRCR under this work stream is limited to the calculation of the IRCR and does not extend to its timing.

2. Consideration of the issues and recommended solutions identified by The Lantau Group with respect to the calculation of the IRCR and identification of any alternative solutions for addressing any identified issues.

   (a) With respect to the calculation of the IRCR the consultant should consider:

   – The impacts of increasing or decreasing the number of Trading Intervals used in the calculation and the associated risks of manipulation by Loads. For example would there be perverse outcomes associated with the use of only 3 Trading Intervals as recommended by The Lantau Group.

   – Whether there are any arguments for maintaining the status quo for the calculation.

   (b) Following endorsement by the RCMWG of any recommended solutions, the consultant will be required to develop the detailed specifications of the calculation.

3. Investigation of the impact of limiting the values for each load used in the Relevant Demand calculation to its respective IRCR for the relevant year. Note that the Relevant Demand for a DSP is calculated at the programme level not at the individual load level.

2. Current calculation of IRCR

2.1 Context for IRCR calculation

2.1.1 Economic intent of IRCR calculation

The IRCR mechanism serves to allocate the cost of reserve capacity to Market Customers. It determines capacity obligations by Market Customer by month for the Reserve Capacity Requirement (RCR) and forms the basis of allocating the Shared Reserve Capacity Cost and the Targeted Reserve Capacity Cost.[2]

The economic intent of the IRCR allocation is not specified in the Market Rules. However, it it appears that the IRCR allocation is generally accepted as attempting to align obligations with the contribution of Market Customers to the RCR.[3]

The IRCR allocation mechanism has a number of potential implications for the Market Objectives, in particular with regard to the objectives relating to [emphasis added]:

(a) to promote the economically *efficient*, safe and *reliable* production and *supply of electricity* and electricity related services in the South West interconnected system;

(d) to *minimise the long-term cost of electricity supplied* to customers from the South West interconnected system; and

(e) to encourage the taking of measures to manage the amount of electricity used and when it is used.

The design of the IRCR allocation may affect these objectives in a number of ways.

1. The allocation method can motivate changes in energy use (perhaps the primary intent) that could improve reliability in the short-term, and/or result in a reduced capacity requirement in future Reserve Capacity Cycles. That is, an IRCR allocation (hereafter a "targeted" IRCR) could result in:
   (a) Loads actively reducing demand at peak Trading Intervals (TIs) thereby reducing reliability risk.
   (b) Loads consistently reducing demand so as to reduce the forecasted need for future capacity.
2. Conversely, the allocation method could motivate changes in energy use in ways that do not improve reliability and/or reduce forecast needs. In such case, the changes in

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2 The Shared Reserve Capacity Cost (defined in clause 4.28.4) is the cost of Reserve Capacity to be shared amongst all Market Customers for the Trading Month. It includes, for example, the cost of any surplus of Capacity Credits relative to the Reserve Capacity Requirement. The Targeted Reserve Capacity Cost (defined in clause 4.29.3(b)) is the cost of Reserve Capacity to be shared amongst those Market Customers who have not had sufficient Capacity Credits allocated to them for the Trading Month.

3 The IMO (http://www.imowa.com.au/ircr) states that IRCR "represents that customer's contribution to the total system load during peak times."

energy use may be inefficient as there is no market benefit. This may also distort long-term decisions by providing a relative advantage to Loads that can benefit from the IRCR allocation.

3. An IRCR allocation that is too volatile (i.e. that varies significantly based on small changes) may create unnecessary financial risks for Market Customers. This may also create uncertainty as to the benefits, thus the incentives to investing in demand management that is in the interests of the Market. [4]
4. There are administrative costs associated with the allocation process.

2.1.2 IRCR and the Reserve Capacity Requirements

The key potential benefit of a well designed IRCR allocation is its impact on the RCR. An IRCR allocation that aligns Market Customer obligations to the requirement for addition capacity can potentially provide incentives for efficient energy use. For example, it is efficient for a Market Customer to manage demand to reduce the RCR by a MW per year if it can do so at cost lower than the long run marginal cost of reserve capacity. An IRCR calculation that allocates the long run marginal cost of capacity to Market Customers based on their contribution to RCR can thus provide incentives for efficient energy use.[5]

The benefits of an IRCR allocation that aligns Market Customer obligations with their contribution to peak demand will depend on the extent to which the IRCR allocation changes behaviour and that this change in behaviour impacts on the overall RCR. This, in turn, will depend on how RCR is determined.

The RCR is based on meeting the most stringent of two reliability criterion specified in the Market Rules. The IMO is currently undertaking a review of the reliability criteria. The current criteria are:

- The peak demand criterion requires sufficient capacity to meet a 1 in 10 year forecast peak demand plus a reserve margin.[6]
- The unserved energy criterion requires sufficient capacity to "limit expected energy shortfalls to 0.002% of annual energy consumption"

The peak demand criterion has been — and appears to be in the foreseeable future — the determining criterion.

Changes in energy use can change capacity procurement requirements. A reduction in consumer demand at peak times will reduce capacity requirements. A reduction in the variability of demand during peaks may also change the requirements — for any overall level

4 For example, consider a factory with a reasonably stable output during peak summer periods. To reduce its IRCR obligation it considers a peak demand reduction initiative that involves a reduction in energy consumption during 2:30 to 4:30pm. However, there is a risk that this initiative provides minimal benefit if the TIs used to determine IRCR are not selected from these TIs.

5 The Reserve Capacity Price tends to reflect the long-run marginal cost of additional capacity to the market.

6 The reserve margin has been determined to account for variation in supply — it based on the size of the largest generator in the SWIS

of demand, the less variable is demand, the smaller the 1-in-10 year peak forecast will be. This later reason provides a justification for rewarding stable demand.

To support the determination of the RCR, the IMO annually performs a Long Term Projected Assessment of System Adequacy (Long Term PASA). As part of the Long Term PASA, a Reserve Capacity Target is forecast for future Capacity Years.

This forecast has been conducted in recent years by NIEIR. The NIEIR forecasting approaches involves top-down and bottom-up approaches. The modelling includes:[7]

- Economic forecasts of the SWIS include projections of population growth, dwelling stock composition and industry growth by sector.
- Separate modelling of Temperature Sensitive Load

The current forecasting approach is reasonably flexible. As such significant shifts in consumption due to IRCR allocations may potentially be a factor in estimating maximum demand. Moreover, the IRCR allocation may influence the energy price for different types of consumption and thus impact on the energy decisions. For example, an IRCR allocation that results in a higher allocation to temperature dependent loads will increase the relative cost of using temperature dependent devices.

The link between IRCR allocation, consumption patterns and future capacity requirements is however somewhat muted:

- There is limited time of use pricing currently in the SWIS (in part due to limited penetration of interval meters in the SWIS). The IRCR obligation associated with loads that do not face time of use pricing, must — by practical necessity — be shared across all energy use regardless of the time of day.
- The changes in energy use motivated by the IRCR allocation may be difficult to detect for forecasting purposes.
- The demand forecast use to determine capacity requirements is made two and a half years in advance.

2.2 Overview of current calculation

The calculation of the IRCR and associated process is described in detail in Appendix 5 (and 5A) of the Market Rules and the Market Procedure for: Individual Reserve Capacity Requirements.

IRCR obligations are determined each month of a Capacity Year beginning October 1. Broadly IRCR is determined by allocating the RCR among Market Customers based on their relative contribution to metered output during the top 12 peak TIs in the previous summer.

The basic concept is shown in Figure 1 below. The RCR is calculated in Year 1 of the Reserve Capacity Cycle. The demand by Market Customers is based on actual demand in 12 selected periods in the Hot Season of Year 3 (being December of Year 2 to March of Year 3

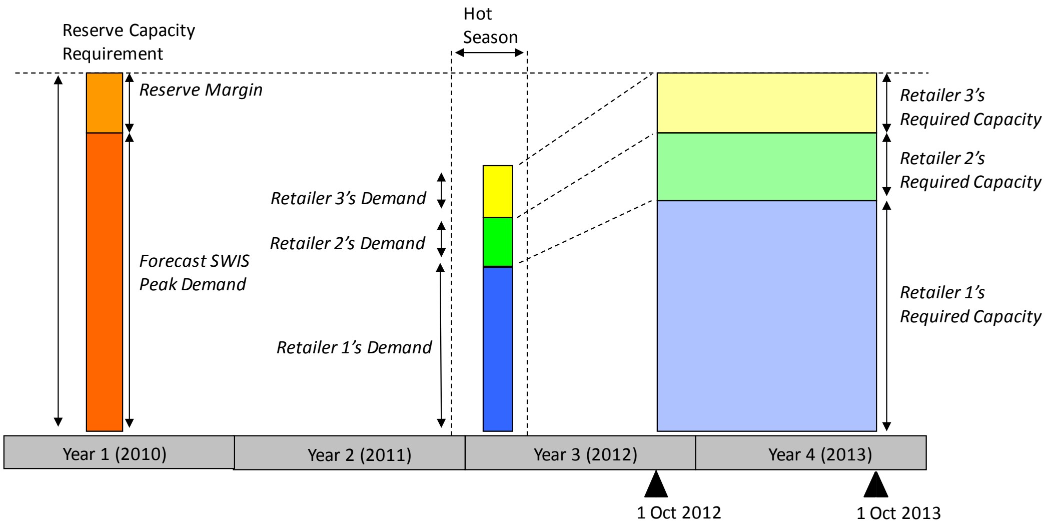
[7] The NIEIR forecast methodology is described in Section 4.2 of the 2012 Statement of Opportunities Report.

inclusive) of the cycle and the relative proportions of demand are used to determine IRCRs that in total match the RCR.

The calculation is based on the median output from the 12 periods selected as the "3 highest demand Trading Intervals on each of the 4 Trading Days with the highest daily demand" where demand refers to total demand, net of embedded generation, in the SWIS. Highest daily demand is calculated based on total energy use during a day.

The Initial IRCR is applied from 1 October of Year 3 of a Reserve Capacity Cycle. It is adjusted each month to reflect changes in meter ownership (customer churn) and the introduction of new meters onto the SWIS. As a result of the introduction of new meters the IRCR allocation per meter will generally decrease over time, however, it could increase should a major load cease to operate (e.g. following a factory shutdown).

Figure 1: Basic concept of the IRCR calculation



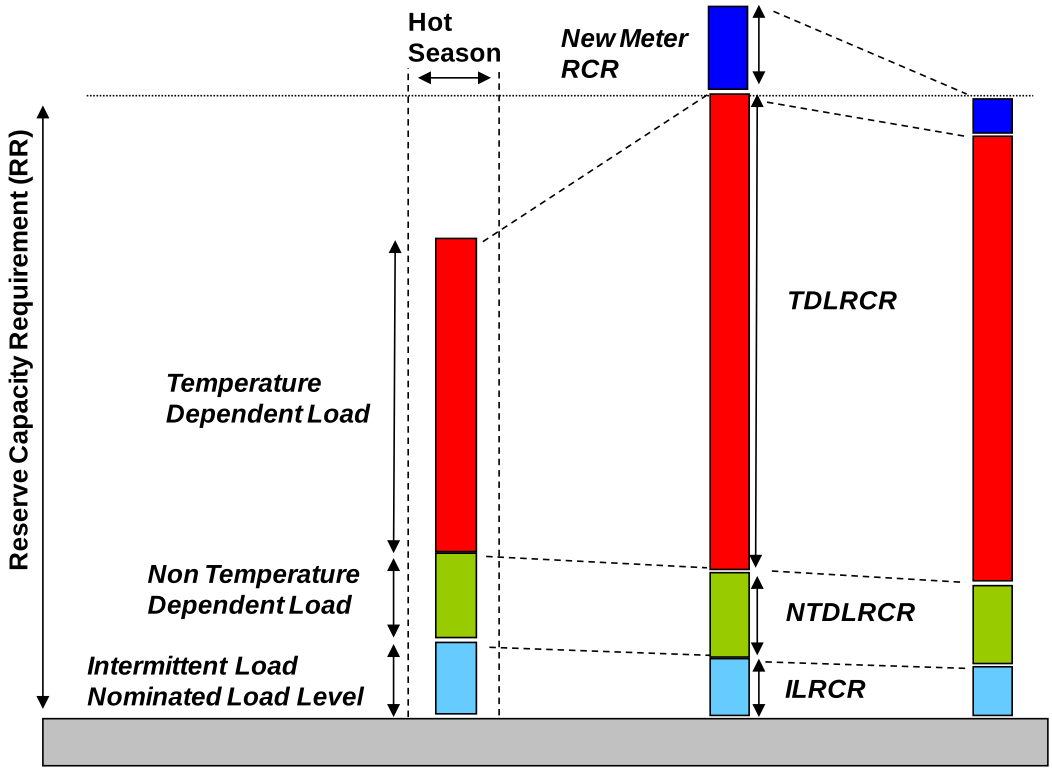
Note: Year refers to years of the Reserve Capacity Cycle.
Source: Market Participant Training: Individual Reserve Capacity Requirement (IRCR)

A Market Customer's IRCR allocation is the sum of the allocations that are calculated for each of the Market Customer's loads. The relative allocation of IRCR for a individual Market Customer's load depends on the load type. There are four different relevant types. These are:

- ***Temperature dependent load (TDL)***. TDLs are the standard (i.e. default type)
- ***Non-temperature dependent load (NTDL)***. A relatively lower allocation of IRCR is given to metered loads that are deemed to be a NTDL. To be deemed a NTDL, Market Customers provide information to the IMO demonstrate the metered loads have low levels of variation.
- ***Intermittent Loads.*** Intermittent Loads are defined in clause 2.30B. These are loads that are largely met by on-site generation.
- ***New meters***. New metered loads are a special category as consumption during the hot season is not measured. The IRCR allocation for new meters for any month (n) is based on the output of the meter in peak intervals during the month three months previously (month n-3).

Different ratios are applied to the different load types so that the total amount of demand still equates with the RCR. This is illustrated in Figure 2 below. As shown the ratios are such that NTDL and Intermittent Loads are allocated less than TDLs.

Figure 2: Illustrative scaling of recorded demand



Source: Market Participant Training: Individual Reserve Capacity Requirement (IRCR)

Three key ratios are calculated (see Box 2 below). These (and their values for August 2012) ratios are:

- **TDL_Ratio** = 1.5758. That is, TDLs metered output is scaled up by 57.58 per cent
- **NTDL_Ratio** = 1.0963. That is, NTDLs metered output is scaled up by 9.63 per cent.
- **Total Ratio** = 0.9807. The Total Ratio is an adjustment applied to all loads after the other ratios have been applied.

The combined effect of the TDL_Ratio and the Total_Ratio is that TDLs metered output (i.e. the median output from the 12 selected TIs) is scaled up by around 55 per cent.

Box 2: IRCR ratio calculations

The ratios are all based on the RCR[8] which is calculated as the Forecast Load (FL) plus the reserve margin.

NTDL_Ratio is the ratio of:

- RCR (=FL + Reserve Margin) less the initial allocation to Intermittent Loads; to
- FL (the forecast load requirement).

Thus the NTDL_Ratio increases the measured load to reflect the Reserve Margin not covered by Intermittent Loads. The NTDL_Ratio is reasonably stable as the Reserve Margin is stable through-out the year, does not change significantly between years and the Intermittent Load amount is small.

TDL_Ratio is the ratio of:

- RCR less the initial IRCR allocation to Intermittent Loads and NTDLs; to
- The total metered TDLs (less allowance for new DSM measures implemented since the last Hot Season).

The TDL_Ratio can fluctuate significantly by year due to changes in the amount allocated to NTDLs and the total metered TDLs. For the capacity year following a low demand summer the TDL_Ratio will generally be higher to account for a larger difference between metered demand and RCR. The TDL_Ratio tends to rise over a Capacity Year[9] due to deregistration of meters (new meters are treated separately).

Total_Ratio is the ratio of RCR to the total initial allocation of IRCR (including Intermittent Loads, NTDLs, TDLs and new meters).

Process of calculation

The Initial IRCR is determined and published by the IMO in September of Year 3 of the Reserve Capacity Cycle incorporating information provided to the IMO by Market Customers in August.

The IRCR obligation by Market Customer is updated monthly. A monthly update is applied primarily to reflect changes in registration of meters. Other changes may occur. The determination of new NTDLs is reviewed monthly. Changes may also occur following the update of meter data from the Hot Season.[10]

The IRCR obligation is levied on all Market Customers supplying metered loads; this includes a small number of retailers and some large energy users.

8 Note: the formula in the Market Rules uses the acronym RR for Reserve Capacity Requirement.

9 There are some exceptions due to modifications of historical metered output and changes in NTDL status. *Between* Capacity Years the TDL_Ratio will may change significantly.

10 This occurred in Capacity Years 2008/09 and 2011/12.

3. Issues and options with the IRCR calculation

3.1 Overview and considerations

The ideal IRCR allocation method would:

- Align obligations closely to the contribution to capacity requirements so as to
  - encourage an efficient demand response, and
  - avoid opportunistic changes in energy use that do not benefit the Market.
- Manage customer risk – An IRCR allocation that is unnecessarily volatile is difficult for companies (who are risk averse) to budget and manage; and may discourage, rather than encourage, investment in efficient energy use.
- Be simple to administer.

The current method broadly achieved these objectives. However, potential modifications to the current method are considered below.

3.2 Selection of peak Trading Intervals

The current IRCR allocation is based on the top 3 TIs during the 4 highest demand days in the Hot Season. However, the RCR is driven by demand during *peak TIs* and not *peak days*.

Highest demand days often, but do not always, align with the days with the peak demand TIs. In each of the last 4 Hot Seasons (not including 2011/12) one of the 4 days used was not in the top 4 demand days as measured by peak demand. A risk is that the use of highest demand day leads to selection of TIs from a day that is unrepresentative of a peak.

A modification to select TIs from peak TIs is a relatively simple change to the Market Rules and would not, it appears, have any adverse consequences.

Proposal 1

The peak TIs selected for IRCR calculations are changed to be selected from Trading Days with the highest peak demand rather than the highest daily consumption

3.3 The number of TIs to determine the IRCR

Should fewer number TIs be used?

The core argument in The Lantau Report for using fewer TIs is that

> *The more trading intervals are combined to set the IRCR the further away the IRCR moves from its economic intent – that is to represent the reasonable peak demand expectation of a given load. Considering the use of fewer Trading Intervals is sensible. The top three Trading Intervals, for example, have been used for analogous purposes in the UK and New Zealand.*

However there are a number of strong arguments against using fewer TIs.

The benefit of focusing on the very peak TIs is likely to be very small. The forecast is designed such that actual peak demand will only meet the forecast demand once in every 10 years. Thus in the vast majority of Hot Seasons actual peak demand is a proxy for the demand driving the RCR. The nature of demand during the 12th, 20th and 50th etc peak TIs will also be just be an indicator of forecast one in ten year peak demand. Thus th potential benefits of using just the highest ranked TIs is likely to be small.

A related risk of using fewer TIs is that it increases the likelihood of gaming of the IRCR. The distinction between 'gaming' and an efficient demand response may be difficult to assess. If a Market Customer consistently reduces their demand at peak times then this may result in a reduction in capacity requirements or an improvement in reliability (in which case it is not 'gaming' but rather a desired response). However if this response is opportunistic and unreliable then there may be little benefit to the Market.[11] If fewer TIs are used, this gaming risk may increase as the incentives to forecasting the peak TIs and opportunistically responding to just those peak TIs increases.

The key implication of gaming is to reallocate IRCR obligations, which in itself is not inefficient in the short-term. However, 'gaming' has a number of negative effects in that:

- The cost of undertaking gaming activities is wasteful e.g. it may involve changing consumption unnecessarily. For example, it is inefficient if a factory temporarily halts production to reduce its IRCR allocation but this does not benefit the Market.
- In the long-term, it distorts energy use towards those who can successfully game the system; that is, Loads that can consistently game the system will pay lower energy costs at the expense of Loads that cannot.

There are other costs from using fewer TIs. An IRCR allocation based on very few TIs will be very sensitive to which few TIs are used. This may create an unnecessary volatility to the IRCR calculation which results in a financial risk for Market Customers (and Loads[12]); that is, using fewer TIs may expose a Market Customer to an unnecessarily high risk that they have an unusually high consumption and thus IRCR allocation.

Similarly, using very few TIs increases the volatility of the benefits for a Market Customer in investing in demand management. For example, if very few TIs are used then a risk to investing in a demand management initiative is that the initiative will not be in place during the few TIs that are used for the IRCR allocation.

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11 Of note, the reduction does not need to be in all 12 TIs. Due to the use of the median value, an IRCR allocation could be eliminated by not consuming electricity in 7 of the 12 TIs. Peak demand can, to an extent, be reasonably predicted.

12 Market Customers may simply pass-on the IRCR allocation cost.

Should a larger number of TIs be considered?

For the reasons discussed above, a selection based on a larger number of TIs might also be considered. A selection based on a larger number of TIs has the benefit of reducing the volatility (i.e. financial risk) of the IRCR allocation to Market Customers and reducing the risk of gaming.

The key downside to using a larger number is that it may dilute incentives to reduce consumption during the very peak TIs. This risk does not appear to be significant and, regardless, could be potentially be mitigated by other measures such as selecting a high percentile amount. There may also be some additional administrative costs.

Of note, the capacity valuation for Intermittent Generation uses 60 TIs over 60 days (5 years x 12 days per year). The RD calculation uses 32 TIs (an 8 TI period from each of 4 months).

A larger number TI selection might be of the top 3 or 5 TIs from, say, 6 or 8 days. If too many days are used there is a risk that weekend demand be incorporated. This would be inappropriate as weekend is extremely unlikely to ever represent a peak; however, this risk could be managed by requiring that the TIs be selected from Business Days.

The appropriate number of TIs is best determined from examining the patterns of demand to examine how the selection of TIs would affect the IRCR allocation. An appropriate number of TIs may be determined such that:

- The number of TIs is small enough so that:
  - The TIs selected are still representative of peak demand periods (e.g. they do not fall in periods that are unlikely ever to be a peak).
  - The IRCR allocation to Loads is representative of their contribution to the peak demand (i.e. the formula used for IRCR allocation is a good proxy to a more sophisticated estimate of the contribution of individual Loads).
- The number of TIs is large enough so that an additional increase in the number of TIs has no material benefit in reducing the volatility of the results to the TIs selected.

Analysis of load profiles

Some preliminary analysis of load profiles during the two most recent Hot Seasons was undertaken. The results suggest that there is no pressing case for change.

The preliminary analysis revealed few cases where the behaviour of a Load was potentially consistent with the Load modifying energy use so as to reduce the IRCR allocation. In these cases the change in energy use was reasonably consistent over a large number of hot days; that is there was no evidence that Loads were able to just opportunistically reduce demand for the few (4) days containing the 12 Hot Season Peak TIs. This suggests that reducing or conversely increasing the number of TIs would have little impact on the behaviour of the Loads that are able to respond. Rather the patterns of use were consistent with desired behaviour of consistent reductions in energy use during periods that reasonably might be a peak load.

The volatility of the IRCR calculation was also considered; this was done by examining the sensitivity of the IRCR allocation to slight modifications in the TIs used. The results highlighted the risk of reducing the number of TIs. For example, if only 3 days (i.e. 9 TIs) were used for the IRCR allocation, the IRCR allocation would vary by over 50 per cent for 1 in 7 Loads of the top 500 Loads depending on which 3 days were selected. While, the volatility associated with the current IRCR allocation might be reduced by using more TIs the analysis did not suggest there was a pressing case for change.

Proposal 2

The number of TIs for IRCR calculation is not modified.

3.4 Use of the median value

The Lantau Report raised concerns with the use of the median to calculate IRCR.[13] As noted in The Lantau Report the use of the median can dilute incentives to reduce demand at the very peak times.

An additional argument against using the median value is that it fails to reward (penalise) loads with stable (variable) loads during peak times. Stable loads (during peak times) contribute less to the RCR than highly variable loads. While stable loads may apply for NTDL status, the requirements for NTDL status are strict and administratively costly for the Market Customer and the IMO.

However, a possible rationale for the use of a median value is to reduce financial risk for Market Customers. If the average (and/or a smaller number of TIs) were used then Market Customers would be more exposed to unusually high levels of consumptions.

Alternatives to the median

Ultimately the choice of the median calculation needs to be compared to alternatives. Viable alternatives that might be considered are:

- Unweighted[14] average of output. An average of output is a simple approach and would reflect to an extent the peak levels of demand. If more TIs were used then the advantage of the median in managing Market Customer financial risk is reduced and an average output measure would appear preferable to the use of the median with little downside.
- Using a higher percentile value. For example, if a larger number of TIs were used then an 80th percentile value might be used (rather than the median, which is the 50th percentile). A percentile approach has the benefit of rewarding more stable loads. However a percentile value is not simply aggregated[15] and could punish Loads with

13 Specifically the report stated that 'The use of the median value approach rather than the mean value means that the highest values are ignored, which makes no sense.'

14 A weighted average of output appears to have no material benefit. A more refined approach would be to apply greater weight to TIs with higher reliability risk. A downside of using weights is that they add to complexity.

15 It is preferable that the IRCR allocation is independent of the extent of aggregation of the meters. That is, it is preferable that the *Sum of the IRCR calculation for each load = IRCR calculation (of sum of loads)*. This property is preferred as it removes any interest in whether meters are aggregated. For example, if an 80th percentile calculation is used then assuming loads are not perfectly correlated, a Market Customer would receive a

output at peaks that is negatively correlated with the output of other Loads during the peak.[16]

On balance there are arguments, for and against the use of the median value. Although there are alternatives that might be considered, given there are arguments for and against the use of the median value there does not appear to be a pressing case for change.

Proposal 3

There is no change to the use of the median value in the IRCR calculation.

3.5 Allocation of IRCR to Associated Loads

3.5.1 Issues

The Lantau Report concerns

The Lantau Report raised a concern regarding the IRCR allocation to Associated Loads of a DSP. The report noted that the capacity credited to a DSP could exceed the IRCR contribution of its Associated Loads — that is, a DSP could offer more capacity than was allocated to its Associated Loads.[17]

This potential outcome reflects that the IRCR allocation and the method of determining the capacity offering for a DSP are separate processes. The capacity provided by a DSP is measured as the difference between actual consumption and Relevant Demand (RD), a static measure of the expected level of demand of the Associated Loads of the DSP. Thus to be able to meet its capacity obligations a DSP needs to have a RD that is at least equal to its level of Certified Capacity. RD, like the IRCR calculation, is also based on the median values of actual metered output from TIs in the Hot Season (see Box 3 below).

lower overall IRCR calculation if metered loads were aggregated into a single meter. The aggregation is of no real significance if there is no practical choice over the positioning/aggregation of meters.

16 Another alternative with similar benefits and costs to a percentile approach (but perhaps more complex) is to use the average plus a multiple of the variance of output from the TIs (this could be capped to prevent it going over maximum output).

17 The Lantau Report stated "A load with an IRCR of "X" MW should not be able to offer more than "X" MW of DSM. No load should be able to offer a DSM capacity value greater capacity than its IRCR, as a matter of logic. For this to be possible implies a problem in the setting of the IRCR itself. As noted, the use of 12 TIs in combination with the median value approach means that it is possible currently for a load to have a DSM value that exceeds its IRCR, and illogical outcomes."

Box 3: Calculation of Relevant Demand

Relevant Demand is determined from 32 TIs during the Hot Season

> The Relevant Demand of a Demand Side Programme [...] is the median of the historical consumption quantities determined by the IMO for each of the 32 Trading Intervals [being]
>
> identify the eight consecutive Trading Intervals with the highest aggregate system demand in each month during the Hot Season of the previous Capacity Year; and [some qualifications/modifications]
>
> Clauses 4.26.2CA and 4.26.2C

The IRCR calculation includes a large uplift (for the ratios described in the previous section) on the metered output values (referred to as the 'contribution to the system peak load', hereafter the "IRCR Load Value"). As a result of this uplift it would be generally expected that the RD of a DSP should be much less than the contributions to IRCR of the Associated Loads of the DSP.

However, there are other important differences in the calculation of IRCR Load Values and RD that may offset the uplift.

First, RD and IRCR use different TIs. RD is based on 32 TIs selected based on 8 consecutive TIs from each of the 4 months of the Hot Season, whereas IRCR is based on 12 TIs selected from the 3 highest demand TIs from the 4 highest demand Trading Days during the Hot Season. A key difference is in the days selected:

- The IRCR TIs have come (in recent years) from predominantly days in February with a few from January.
- The RD TIs are, by design, evenly spread across the months of December, January, February and March.

Thus an Associated Load with a low consumption in February relative to the other Hot Season months may have a relatively large contribution to RD compared to the IRCR Load Value determined for IRCR purposes.

Second, an important difference is that for calculating RD, the output of loads may be adjusted. This may occur when the Market Customer (to which the DSP is registered) requests that an estimate of consumption be used because the Associated Load 'was operating at below capacity due to its consumption being reduced at the request of System Management or because of maintenance'.[18]

[18] Specifically clause 4.26.2C (b)(iii) states that the MW quantity to be used in calculating Relevant Demand will be "where a Market Customer provides evidence satisfactory to the IMO that the Associated Load was operating at below capacity due to its consumption being reduced at the request of System Management or because of maintenance, the IMO's estimate of what the consumption of the Associated Load would have been if it had not been reduced, multiplied by two to convert to units of MW."

Finally, RD is determined for a DSP Facility and cannot be easily disaggregated to contributing Associated Loads. IRCR is determined for a Market Customer but its calculations are made for each metered load and then aggregated for the Market Customer.

Gaming and Associated Loads

An additional but related behavioural concern is that differences in the rules for the calculation of the RD for a DSP and the IRCR for a Market Customer provide incentives for gaming. In particular, an Associated Load may:

1. Reduce its consumption during periods expected to be the peak TIs used for IRCR calculation
2. Subsequently, via the DSP to which they belong, request substitution of metered output values on the basis that their consumption was low during these intervals due to maintenance.

By doing so the Associated Load may make a low contribution to IRCR but still achieve a high contribution to RD for its associated DSP.

This issue was first raised with industry during consultation on RC_2010_29. Such gaming potentially has a number of negative implications. It can result in:

- Higher administration costs borne by the IMO and the DSM Aggregators associated with processing the 'maintenance' requests.
- Changes in energy use by the Associated Loads that may not benefit the Market (e.g. a factory reducing consumption with no benefit to the Market).
- Distortion of the value of participating in DSM.

3.5.2 Assessment and options

The discussion above highlights two issues.

First, is that there is the seemingly illogical result that the level of curtailment determined for a DSP may be more than the IRCR contribution of its Associated Loads, which is itself a measure of consumption during peak TIs plus an uplift.

Second, is that the difference in the calculation of the IRCR and RD processes provides a gaming opportunity involving Associated Loads opportunistically reducing consumption to reduce IRCR obligations and then applying for modification of metered output for the purposes of RD calculation.

It is not logical and does not appear fair that the RD for a DSP can exceed the IRCR contribution of its Associated Loads (particularly given the application of the ratio adjustments — discussed in Section 2.2 — to the metered outputs). However, it is not necessary that the RD and the IRCR calculations be based on equivalent measures of energy use as the RD and the IRCR serve different purposes:

- The RD reflects the amount to which DSPs can be relied upon to reduce demand when required
- The IRCR is used to determine an allocation of the capacity cost.

The concern expressed in The Lantau Report, is a concern that the RD may be relatively high compared to the IRCR Load Values. However, the reverse problem can also occur. Due to differences in the calculation process, the RD of Associated Loads could be relatively low compared to the IRCR Load Values. That is, the RD might understate the DSP's level of curtailment that might be expected. The implications of RD being too low, is that a DSP may need to acquire more Associated Loads to meet its obligations thereby increasing the cost of providing DSP capacity to the market.

Nevertheless, RD values that are greater than associated IRCR allocations is cause for concern as it suggests that RD may be overstated. Incorrectly reflecting the amount of capacity that can be provided by a DSP will mean that system security is potentially at risk. That is, if a larger RD has been calculated for a DSP than it is capable of delivering and System Management dispatches that DSP the required reduction will not be able to be achieved.

A challenge to any modification that aligns IRCR calculations with RD calculations is that they are different processes. There are some issues. In particular

- As noted above:
  - RD is calculated for a DSP Facility, whereas IRCR obligations are passed to Market Customers (other than a DSM Aggregator), which may not be passed on to the Associate Load.
  - RD is calculated from the median value of the sum of the aggregate output of the Associated Loads. This median value cannot be simply disaggregated into the Associated Loads.
- Arguments have been raised to modifying the RD calculation and in particular shifting to a 'dynamic' RD calculation, whereby the DSP's true ability to deliver a decrease in consumption is more accurately estimated (i.e. changes by time of year, day of the week or time of day). Such a change may limit the extent to which RD and IRCR can be aligned.

Given these considerations a number of options were considered. Of these the following option was identified as being worthy of further consideration.

Option: Limit modifications to the load values used in the RD calculation to match IRCR values

An option is to limit the modification made to the RD load values to an amount based on the IRCR values for the relevant year.

This option is to apply a limit to the modified values, under clause 4.26.2C (b) iii, to be no more than the Associated Load's median output measured for IRCR. The approach could be implemented by a simple addition of a clause that limits "the IMO's estimate of what the consumption of the Associated Load would have been if it had not been reduced" to be no more than the Associated Load's "contribution to the system peak load" for IRCR, which is currently calculated from the median value of metered consumption during the 12 (IRCR) peak TIs.

The benefits of this change would be two fold.

- It would reduce incentive to game the RD process by applying for adjustments due to maintenance.
- It would more closely align a DSP's RD with IRCR.
- Would not restrict legitimate requests for maintenance intervals to be substituted.

The administrative cost of this option would be light as it only applies when maintenance adjustments are requested. To the extent that it dissuades maintenance adjustments it would reduce administrative costs borne by Market Customers in making modifications.

Furthermore, the option does not limit future refinements to how RD is calculated (e.g. implementation of a dynamic baseline).

Proposal 4

Consideration is given to limiting the modifications to load values used in the RD calculation whereby the modified RD values cannot exceed the Associated Load's IRCR calculation of "contribution to the system peak load".

3.5.3 Double counting when DSPs are used

A related issue is that there is potential for double counting to occur when DSPs are dispatched by System Management. It is possible (and perhaps likely) that DSPs are dispatched during peak TIs selected for IRCR allocations. In such circumstances, the metered volumes of the Associated Loads will be (as a result of responding to the Dispatch Instruction) lower than normal. However (in accordance with clause 4.26.2C see footnote 18 on page 14 above) for the RD calculation an estimate of the output had the dispatch not occurred will be used. In effect, the DSP Associated Loads will receive the double benefit from the same event of a lower IRCR allocation and being rewarded for providing capacity (for which they receive capacity credit payments and dispatch payments).

To address this issue a potentially simple change would be to adjust the metered output used for calculation of IRCR to be (consistent with that used for RD) the estimate of the Associated Load's output had it not been dispatched.

The key benefit would be to remove a distortion in the benefits provided to Associated Loads that occurs when a DSP is dispatched during TIs used for calculation IRCR. Given the low frequency of DSP dispatch, the benefits of such an adjustment are likely to be small.

However the costs of implementing this modification may also be small; the information required to make the adjustment (i.e. the estimated output of the Associated Loads had the dispatch not occurred) will be readily available as it is determined for the purposes of estimating RD.

Proposal 5

Consideration is given to adjusting the output of Associated Loads for IRCR calculations when the Associated Load has been dispatched as part of a DSP.

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Memo

To:	RCM Working Group
From:	Mike Thomas
Date:	September 2012
Subject:	Brief Note on Capacity Refunds Mechanism

1. THE CAPACITY REFUNDS MECHANISM

This note is intended to facilitate discussion within the RCM Working Group of possible changes to the Capacity Refunds Mechanism (CRM). It attempts to establish a clear purpose for the CRM and indicate how the CRM affects, and is affected by, the Reserve Capacity Mechanism (RCM). Combing through the various studies, statements and reports concerning the CRM, it is clear that a range of views exist as to the purpose, effectiveness, intent and results of the CRM.

We draw on a number of key prior documents: the report by the IMO entitled *Review of Capacity Cost Refunds* (dated 5 April 2011 and referenced here as "RCCR"); a *Reserve Capacity Refunds – some principles, scope of RDIWG work and next steps* (dated 3 May 2011 and referenced here as "RCP"); and TLG's *Capacity Refund Proposal: Brief Review* (dated 26 May 2011 and referenced here as "CRPBR". We also note that significant analysis of the refunds issue has previously been conducted by the IMO and the RDIWG.

1.1. WHY HAVE A CRM?

The CRPBR – based on the Wholesale Market Objectives as set out in Section of 122(2) of the Electricity Industry Act and repeated in clause 1.2.1 of the Market Rules, the RCCR and RCP – identified five separate possible purposes of the CRM:

- **Long-term incentives**. The stated intent of the refunds mechanism is to "incentivise long term maintenance activity which will minimise future risk to system security and system reliability." [RCCR, p. 6] In particular, there appears to have been a strong feeling that episodic refunds would provide an insufficient incentive and that the lack of a consistent refund risk may lead to "free-riders." Subject only to System Management's potential reluctance to approve outages at peak "[t]he profile can be structured so the probability of the peak refund not applying at any time during the year is low and as a result delivers an incentive to undertake maintenance for all peak periods and reduces the risk that a participant may choose to risk avoiding exposure and not pursue an adequate maintenance regime." [RCCR, p. 11]

- **Short-term incentives**. A second stated intent is to "Incentivise short term behaviours to ensure day to day operation and maintenance activities are directed to maximising reliability at time of greatest value, generally when actual reserves are lowest." [RCCR, p. 6] It is interesting to note, however, that the short-term incentive is not really an incentive to make capacity available. "This is an important feature of the design, as it means refunds are (implicitly) directed at influencing plant reliability and maintenance performance, not the amount of capacity available to the Market per se." [RCCR, p. 5]

- **Fairness**. "Due to the exposure of participants to refunds through Resource Plan shortfalls the current refund regime may create an imbalance in the exposure to refunds for participants with generators with differing utilisation rates." [RCCR, p. 6] Similarly, the proposal "provides a refinement that creates incentives for both short and long term scheduling of maintenance effort and more equitable treatment of different forms of capacity." [RCCR, p. 9] "As far as practicable all capacity providers should be treated equally." [RCCR, p. 20]

- **Level of refunds**. "The level of refunds overall" is noted as an issue in the design of the mechanism. [RCP, p. 4] Much effort is directed at retrospective analysis of refund levels. "If there was a significant reduction in the level of refunds returned by the scheme for no specific efficiency gain, – this would, in effect, increase the net value of the reserve capacity scheme itself – right at a time where there are concerns that the reserve capacity market may currently be too 'generous'." [RCP, p. 5] Thus, maintaining the level of refunds appears to have become a goal. [RCP, p. 6] recommends that "the RDIWG would then progress work on… developing a dynamic refund regime with no significant changes in refund levels."

- **Volatility of refund revenues**. This appears explicitly in the discussion of issues – "The volatility of refund revenues." [RCP, p. 5]. It also crops up in discussion of the shape of the refund/reserve level relationship. "If refunds were based only on LoLP, refunds would be likely to fall to very low levels for reserve that was more than a relatively low margin above the largest unit, but would also lead to very high refunds well in excess of the current maximum level that applies in peak periods of summer. This would change the risk exposure and prudential risks in the market and should only be contemplated if it is clearly a net benefit – this not expected." [RCCR, p. 8]

It seems fair to say that the CRM is at risk of being pulled in a number of potentially different directions. In our view, it is necessary to consider the CRM and RCM together.

2. THE CRM AND RCM IN CONTEXT

The key issues with the CRM are similar to those that exist with the RCM. The current forms of each map poorly to the underlying economics of capacity value determination. A perfect match is not the objective here, especially given that the perfect can be the enemy of the good, or fraught with unintended consequences in any event. That said, we believe significant improvement is possible, and is justified by, among other things, the increasing risks over time created by mechanisms that fail to align well with underlying market forces.

It has been argued and accepted that the CRM and RCM should be considered together. Indeed, in our 2011 review of the capacity refunds regime, we noted:

> *A change to the way the RCM responds to market conditions will affect the value at stake when refunds are triggered. Alternatively, a change to the refund regime will affect the value and effectiveness of the overall RCM. We therefore recommend linking a change to the capacity refund regime to the outcome of the broader RCM review.*

As practical options for RCM reform have since narrowed, it is time to consider the RCM and CRM as a package, as their workings, together, will influence future investment and behavioural incentives.

2.1. INTER-RELATED MECHANISMS

The fundamental rationale for proposing changes to both the RCM and CRM is that, for all intents and purposes, neither adjusts to changing market conditions. To our view, the extremely limited level of dynamism present in current arrangements is poorly targeted and cannot plausibly be argued to be effective or consistent with the Market Objectives. Changes are necessary and should be made consistently, considering the RCM and CRM as a package, as both affect the commercial risks associate with investment and use of reserve capacity, not to mention risks related to the longer-term adequacy of appropriate resources to support system security.

Whereas the RCP is established based on annual measures, the CRM applies on a much shorter-term timescale. Market conditions in the short-term range more widely than annual measures can capture. Prior work by the IMO and RDIWG support amplifying or attenuating refund exposure based on short-term market conditions. As a matter of economics, this makes clear sense.

The CRM effectively qualifies the capacity resources for which the capacity price is paid. Higher quality capacity (better availability and performance) will naturally face lower refund risk, and thus will earn more value from the overall RCM+CRM "package". As the IMO noted in its "Review of Capacity Cost Refunds", 5 April 2011:

> *The current capacity refund mechanism requires Market Participants (Generators) who have been paid for capacity (through Capacity Credits) to pay refunds if that capacity is not made reliably available to the market. The current capacity refund mechanism requires capacity refunds to be made if accredited capacity presented to market is less than (temperature adjusted) accredited capacity:*
>
> - *as a result of (unplanned) Forced Outages; or*
> - *where a Market Participant presents to Market less capacity than is required, accounting for Reserve Capacity Obligations, Forced Outages and the Capacity made available to the Market in each trading interval*
>
> *Specifically the capacity refund mechanism requires a Capacity Credit holder to make repayments to the IMO if the capacity is not presented[5]. The refund is currently set on a time based schedule within the Market Rules and weighted to times when high demands are more likely when reserves may be low and the potential risk to reliability highest. The weighting is achieved by setting the refund to a multiple of the payment that the capacity provider will receive over the period of reduced capacity. The refund creates a financial incentive for capacity providers, without an approved outage, to ensure capacity is made reliably available during times when the potential threat the system reliability is highest.*[1]

When investing in new capacity resources to serve the WEM, the materiality of exposure to refund-related risks is a natural component of the investor's commercial evaluation. Poor quality capacity should, in fact, be exposed to greater risk of capacity refunds, as that is an obviously sensible way to reward the underlying performance characteristics of different types of capacity in a non-discriminatory way (just in the same manner that other economic performance characteristics—such as lower dispatch costs—are rewarded).

The risks of rewarding poor quality capacity too much are compounded if the RCM and CRM do not work together consistently. The more excess reserve capacity exists, the lower the risk a unit will be called (and thus exposed to refund risk). Clearly, the only way to offset this risk is through the testing regime and through the RCM itself in which the value of a capacity credit is more tightly linked to market conditions and is much lower when there is more excess reserve capacity. The risk of refunds decreases when excess reserve capacity increases, but so to should the value paid for reserve capacity. In the changes proposed to the RCM, the key element is the "slope" factor, intended to better mimic the implications of market-based pricing by varying the IMO-paid value of reserve capacity more dynamically with market conditions.

1 "Review of Capacity Cost Refunds" , IMO, 5 April 2011, section 2.2.

Conversely, as the amount of excess reserve capacity reduces, exposure to the risk of refunds for should increase. Units with relatively higher dispatch costs will see increased likelihood of being dispatched, and thus risk of refunds should they fail when called. These interactions form a logical set of incentives to reinforce desirable operational and investment behaviours.

2.2. ALIGNING ECONOMIC MECHANISMS WITH INCENTIVES AND OUTCOMES

As discussed at length with the RCMWG with respect to the RCM itself, the *economic value* of "pure" capacity is determined under a very, very narrow range of circumstances over the course of a capacity year. This point is also noted in the IMO's report:

> *Short term risk to reliability of supply can be measured by the Loss of Load Probability (LoLP). However, if refunds were based only on LoLP, refunds would be likely to fall to very low levels for reserve that was more than a relatively low margin above the largest unit, but would also lead to very high refunds well in excess of the current maximum level that applies in peak periods of summer. This would change the risk exposure and prudential risks in the market and should only be contemplated if it is clearly a net benefit – this not expected. It would also require acceptance that long-term incentives relating to maintenance programs was entirely reliant on short term risk.*

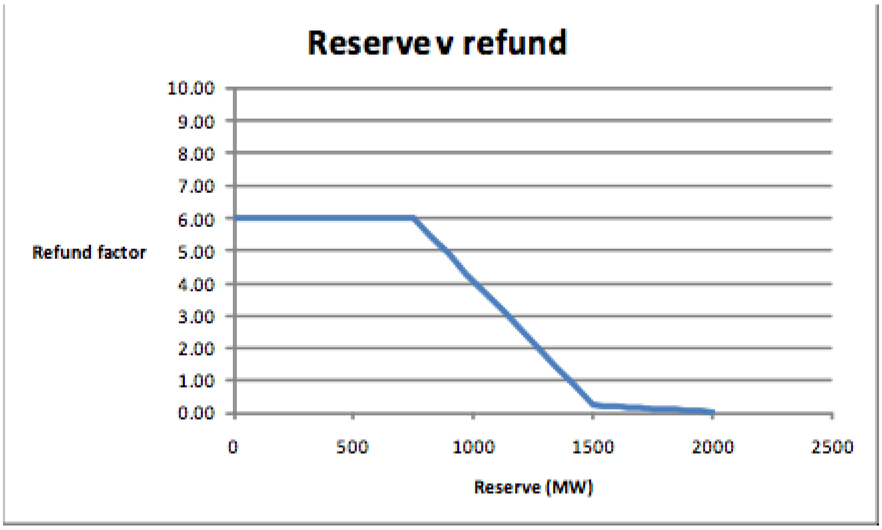
As reflected in discussions within the RCMWG and in the IMO's recommendation with respect to a dynamic capacity refunds regime, there are practical limits to how much economic value of capacity can be attributed to just a few capacity periods without creating an even more problematic financial risk exposure. This problem, which we've termed the "zero/infinity" problem, requires that we draw back from the pure economic case and identify a practical alternative.

2.3. THE DYNAMIC REFUND REGIME PROPOSAL

The dynamic refund regime proposal, tabled by the IMO on 5 April 2011, would limit CRM risks through a set of factors proposed to range from zero to six, as noted by the IMO:

> *The IMO proposes that the maximum refund factor remain at the maximum value of 6. As noted analysis of the 2008 and 2009 calendar years shows that the cumulative refund amounts under the Market rules and the proposed methodology are similar. The IMO considers that as the design is aiming to produce a pragmatic balance between long and short term incentives a different level of maximum refund factor may not necessarily yield a more efficient or effective result although there is an element of choice about the level adopted. The current defined maximum level of 6 is yielding a level of refunds that is established in the Market and as noted delivers similar to outcomes over a year.*

The refund factor relationship to reserve is shown in the attached "clipped" figure from the IMO report:



As a result of the proposed dynamic refund relationship, the relationship between reserve and refund exposure "cleans up" considerably as compared to the current arrangements, as shown below, again "clipped" from the IMO report.

Figure 9 Refund rate versus reserve in calendar 2009: dynamic settings

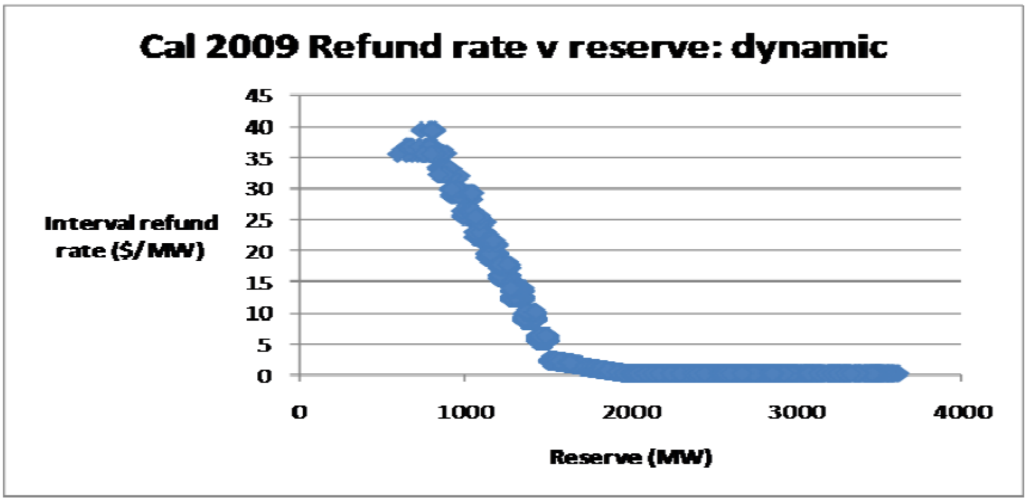
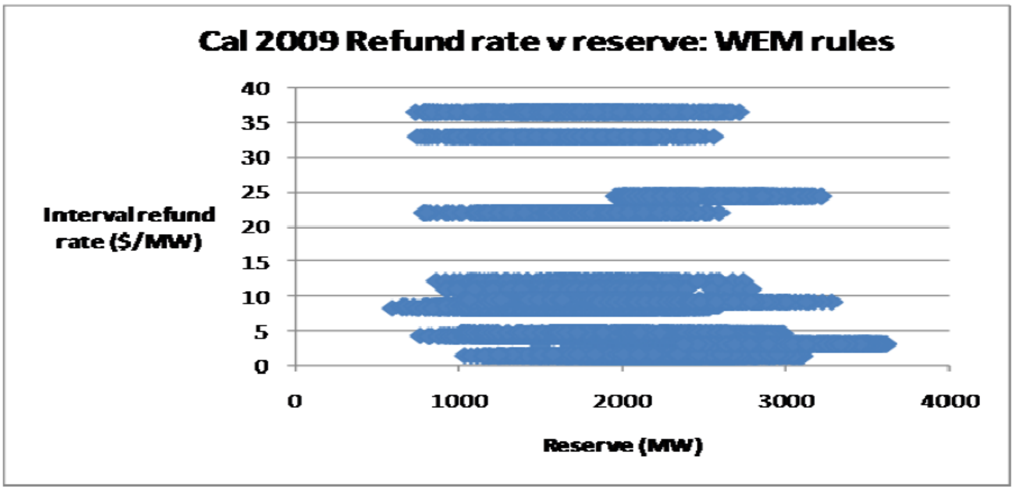


Figure 8 Refund rate versus reserve in calendar 2009: WEM rules



The proposed "dynamic" regime is very clearly a large step in the right direction. In particular, the dynamic regime would make all capacity resources pay more attention to the level of reserve. The current arrangements present so much noise that it behooves us to think that anyone exposed to refund risk would even bother to be concerned with actual system conditions, as opposed to the simple "clock-based" factors. So the proposed dynamic refund factor regime is an excellent move in the right direction. Furthermore, the dynamic refund regime aligns well with the proposed changes to the RCM, given the steeper slope that defines the maximum annual refund exposure based on system reserve conditions.

2.4. Evaluating the Dynamic Refund Proposal

The desired behaviours under the RCM are straightforward:

- Ensure that when capacity additions are not fundamentally economic, they are not added – or are at least not materially paid for by consumers; and
- Ensure that there is enough capacity.

The desired behaviours under the CRM are equally straightforward:

- Ensure that customers do not pay top shelf prices for bottom shelf quality; and
- Ensure that capacity resource providers have incentives to be available and to be able to operate as needed whenever called for dispatch.

Naturally, both should work together to signal appropriate types of capacity so as to promote lower costs of energy and capacity over time, given that it is the interaction of capacity and dispatch that determine costs to customers and revenues to capacity resource investors.

For both the RCM and CRM, therefore, the first central issue is value for money – are consumers getting value aligned with what they are paying for. The second central issue is whether capacity resource providers have sufficient incentives to be available in both the short and longer-terms. In economic terms, both issues are central, and both are equally important.

The RCM and CRM are naturally linked in economic and commercial terms. Operators and investors expect to receive a value for their capacity that is based on their projections of the RCP as modified by their expectation of refund exposure. From a commercial perspective, refund exposure is not merely about operational readiness—though that is principally what it incentivises. It is also a part of the long-term value equation that influences the type and timing of new investment, at least to the extent that that refund exposure is material.

The targeting of refund exposure into "value" periods is therefore an important consideration. If refunds are collected materially from non-peak periods, then the refund exposure could distort the perceived economics of investment in baseload generation, or any other type of generation, such as wind in WA, that operates significantly during non-peak periods. Conversely, if refunds are not sufficiently concentrated in periods of low reserve capacity, the CRM could reduce the perceived benefit of higher quality but more expensive peaking capacity. The degree of distortion depends on the precision of the CRM. Although perfection in targeting is neither possible nor desirable (due to the offsetting problem of exponentially increased financial risk), the search for a practical solution at least needs to reflect on—and ultimately accept a level of exposure to—these risks. An acceptable outcome is one in which the degree of potential distortion is deemed immaterial or acceptable given other risks that have to be taken into account.

The dynamic refund proposal fares well against this framework, at least in theory and concept. The specific "slope" and cut-off points reflect the outcome of significant analysis that has been done to date regarding exposure and targeting. However the analysis and proposal were developed apart from the recommendations regarding the RCM. To that end, some further refinements are worth the consideration of the RCMWG.

2.5. ISSUES TO BE CONSIDERED

Using the dynamic refund regime proposal as a baseline, we recommend several changes be considered – some of which will require some additional analysis to fine-tune or vet:

- Steepen the "slope" (e.g., increase certain refund factors) to increase exposure during more critical periods;
- Concentrate more refund risk into peak months (out of off-peak months), subject to consideration of maintenance outage planning requirements;
- Redistribute refunds to those capacity sources that actually provided capacity during refund events;

- Correspondingly adjust next year's RCP downward by the amount of refunds collected to preserve the overall value for money that is currently realized (because current refunds flow through to customers).

Each is discussed below further, with suggestions for analysis and discussion.

- Steepen Slope

  - The incentive aspect can be further strengthened under lower reserve conditions. A much higher factor or a smoother curve could apply such that the maximum factor is higher – more in line with economics of capacity value. Whereas such a steeper CRM slope would certainly introduce more refund risk, the proposed RCM changes clearly reduce the risk that lower levels of reserves would actually occur. Logically, if there will be a stronger signal *as the amount of excess capacity works down*, then there can also be a stronger refund risk – the two signals complement each other.

  - The primary concern is likely to be that a steeper slope introduces additional risk, which of course is the intent, but that the risk may create financial exposure that exceeds the practical value of the corresponding beneficial incentive sought to be created. The arguments to make the slope steeper (and indeed the slope should be made steeper) to the extent that financial exposure to random outcomes ("noise") can e reduced and the exposure to real performance differentials increased. From a value for money perspective, the financial demise of an unreliable capacity source that does, in fact, fail to provide capacity when needed, seems an entirely appropriate situation in which to require a substantial refund.

- Reallocate/concentrate refund risk over time

  - An important CRM issue is to consider what specific level of refund exposure is appropriate in each time period. Currently, some shaping of refund exposure by month (peak vs non-peak) exists, as was introduced in 2007/08. But the result is one in which a significant portion of exposure remains in off-peak or shoulder Trading Intervals. The result would appear to reduce exposure to refund risk for poor performance during peak periods and to increase exposure to refund risk of capacity that is clearly dispatched on a regular basis and that, therefore, has relatively less need to be "qualified" to determine that it can actually *be* dispatched. This issue merits further consideration so as to ensure it is resolved in a manner consistent with the overall CRM/RCM framework.

- “Recycle” refunds to sharpen incentives

    - One of the ways to reduce the impact of “noise” – the random outage that can affect any form of capacity – is to “recycle” the refunds such that noise has an opportunity to cancel across capacity resources over time. Suppose that all resources are likely to fail randomly at any point in time. If the refund incurred during a failure is then redistributed to the capacity resources that do not fail, the average “noise” will cancel out over time, with the capacity that is less reliable, on average, bearing the full brunt of the refund exposure. This creates both a more equitable outcome and an incentive to “improve” average performance over time.

    - Full vetting of this idea will require some additional analysis, and will likely attract a variety of views, but initial indications are encouraging.

    - The value of “recycling” is that it allows sharper incentives that absolutely will disadvantage consistently worse performing capacity resources, but should greatly reduce financial risk to robust capacity resources that experience merely the average level of unplanned failures.

    - A result of recycling would be that Market Customers would not receive “refunds” – unless a separate mechanism is incorporated as per below.

- Adjust RCP to account for loss of transfer of refunds to Market Customers

    - Approach one would simply take the level of refunds that have been recycled and use that calculated value to reduce the RCP in the subsequent year by a corresponding percentage. This approach would be faithful to the current treatment of refunds to Market Customers and would result in zero value loss to Market Customers while simultaneously enable a sharper and more equitable targeting of refund-related incentives for capacity resources.

    - Approach two would skirt the issue of recalculating the level of refunds each year and would simply impose a fixed reduction to the RCP – say 1 or 2 percent – that reflects a broad estimate of foregone refund value. Approach two has the benefit of simplification and may be more appropriate if implementation complications exist.

    - Obviously, the recycling option could be ignored and refunds made to Market Customers directly as per the current arrangements, but one should at least ask what purpose, in economics is served. To the extent that the refunds regime is intended to incentivise availability and qualify performance characteristics such that poor performing capacity loses access to the full value of a capacity credit, then the recycling based approach achieves that significantly more comprehensively than the current regime.

2.6. Outage Planning Process

The CRM has a clear logical connection to the outage planning process. If System Management approves a maintenance outage, the resource that is approved is not exposed to refund-related risk. It is possible, therefore to attempt to use the maintenance scheduling process to reduce exposure to refund risk without necessarily undertaking any material improvement in unit performance. In effect, by seeking to schedule as much maintenance as possible through System Management, the number of periods in which a capacity resource is exposed to refund risk is reduced.

The design and features of the CRM as well as the RCM in general affect these incentives. For example, if the amount of excess reserve capacity increases, the proposed RCM settings would result in a reduced RCP – reducing the incentive to retain or develop capacity. A more dynamically oriented CRM would then *reduce,* potentially to zero, exposure to refunds during periods in which there is ample reserve capacity available. The risk of *strategic* reliance on maintenance outages should therefore be reduced – the question being only of whether more refined parameters, mechanisms or settings would reduce this risk even further. The "recycling" approach noted above has the benefit of not only penalising non-performing capacity, but also incentivising performing capacity. The latter constitutes an incentive for units to reduce their time spent in maintenance, as they would be foregoing a "reward" for being available during periods when other capacity has failed.

Two additional considerations seem worthwhile to consider:

- First, if market conditions are such that System Management would have no problem approving scheduled maintenance, these conditions should also correspond to periods in which the risk of material refund exposure are low. In effect, the alignment of refund exposure and system conditions is crucial.

- Second, the testing regime clearly plays a crucial role in supplementing the refunds regime as a way to ensure that capacity resources are of a quality that corresponds with the capacity value they receive over a year. A combination of more frequent testing of little used capacity resources, more extensive reliance on reporting and explanation of extended or unusual reliance on maintenance outages, together with more sharp refund exposure during periods more critical to system security is the prescribed approach.