

Independent Market Operator



**Report to the Market Advisory
Committee from the Reserve Capacity
Refund Mechanism Working Group**

Date: 4 May 2007

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1. INTRODUCTION

At its first meeting, held on 28 February 2007, the Market Advisory Committee (MAC) agreed to establish a Working Group to develop a revised Reserve Capacity Refund mechanism. This requirement arose following identification of shortcomings with the present arrangements. In summary:

- The wording describing the refund mechanism in the Market Rules requires more clarity.
- The out-workings of the Market Rules do not reflect the intention of the refund mechanism.

The Working Group was established in March 2007 under a Terms of Reference which is attached as Appendix 1.

The Working Group has met three times and has developed a structure for presentation to the MAC for discussion.

The Working Group has also developed a set of refund levels that could apply in various trading intervals and this is also provided to the MAC, as a basis for a final refund arrangement, for discussion.

2. THE REFUND MECHANISM

All facilities that have been assigned Capacity Credits are, unless they are undergoing an approved outage, required to make refunds to the market in the event that they are unable to offer their full capacity through bilateral contracts or into the STEM. The development of the original refund mechanism was based on a number of significant objects for the success of the market (albeit that some of the objectives were conflicting):

- The level of refunds for each outage should be set at the appropriate level to provide the incentive for generators to meet their Reserve Capacity Obligations.
- There must be a very strong incentive on peaking plants to deliver capacity when required (because there may be no other spare generation capacity available on the system) but these plants may only be called on to run for a few hours each year.
- There must be a strong incentive to encourage capacity providers to be fully available at peak times but there must also be incentives for good performance at other times of the year when scheduled outages reduce the available system capacity.
- While refund levels should be high enough to encourage good operational performance, they should not be so high as to deter investment or force capacity providers to include an excessive risk component into their pricing.

The Working Group determined that equity between participants should also be considered in developing the mechanism. In particular, an outage of a given size,

say 50 MW, should incur the same level of refund irrespective of whether this was a full outage of a 50 MW unit or a partial outage of, say, a 150 MW unit.

Refunds are determined in accordance with Market Rules 4.26.1 and 4.26.3. Copies of these Rules are attached as Appendix 2.

Refunds that apply comprise:

- A refund level that applies in each peak or off-peak trading interval.
- A cap that is applied per day.
- A cap that is applied to the total refund applicable in any season.
- An annual cap based on the amount of Reserve Capacity payments received by the facility.

It was intended that a facility that experienced a short outage would face a high initial refund. For longer outages, the total refund would be capped by the daily, seasonal and annual caps. However, the way in which the Market Rules are drafted results in the seasonal cap overriding the daily and trading interval refund rates under all circumstances. This results in significant reductions in refund levels.

It should be noted that one Market Participant, Alinta Sales has suggested that the Market Rules be applied differently. This difference of opinion is considered a significant issue in itself and highlights the need to requirement to remove any potential ambiguity within the Market Rules.

3. REFUND OPTIONS CONSIDERED BY THE WORKING GROUP

The Working Group initially considered three options.

- To rework the existing Market Rules to attempt to correct the current difficulties.
- Adopt a different concept with refunds being made proportional to the amount of demand on the system, or proportional to the amount of reserve generation capacity, at the time of the outage.
- An alternative concept in which refunds incurred by a facility would accrue at a rate which increases as the number of outages increases.

It was considered that the first of these, to rework the existing rules, should be initially progressed as it should result in the minimum change to the rules. This was considered important in view of the significant amounts of money that may be associated with refunds and the desire to maintain stable market arrangements to encourage investors.

The second option was seen as a way to link the level of refund to the level of system risk arising from each particular outage. This was considered to be a good concept but one that may increase the risk to generators and investors through uncertainty with respect to the system wide risk. It was also considered that a “real time” outage mechanism was not necessarily compatible with a “day ahead” market.

The third option was not pursued in detail. This approach was considered to be more suitable for an energy only market such as in the Eastern States.

4. REWORKING OF THE EXISTING MARKET RULES

The original intention was to have a refund mechanism which:

- Applied a high refund for the initial trading intervals during any forced outage to provide a strong incentive to avoid such outages.
- Reduced the level of refunds if the outage continued over a full day.
- Had a further increase in the refund rate if the outage continued over a prolonged period.
- Always had some level of refund, even when a facility has been out of service for a very long time.
- Had the total refund level capped over any season and over a full year.
- Have higher refund levels during peak summer times.

The current Market Rules set the level of refund applicable for an outage occurring in a peak trading interval to be 8 times “Y” where “Y” is the Reserve Capacity payment for that Trading Interval (the monthly Reserve Capacity payment divided by the number of Trading Intervals in the month). The rate during off-peak trading intervals is 2 times “Y”.

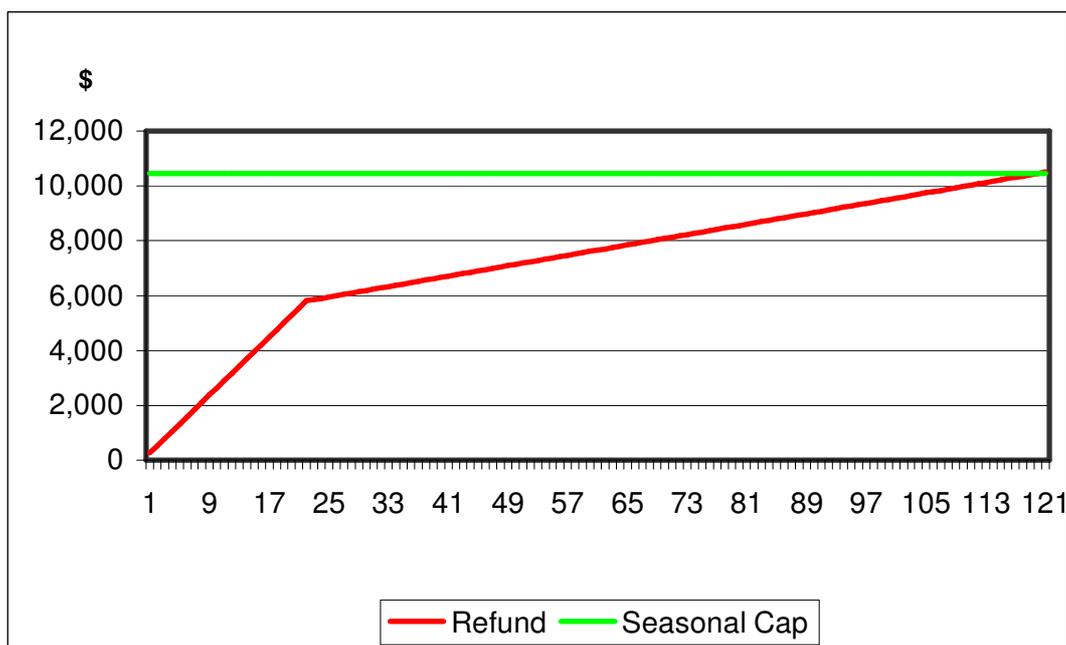
The daily cap is set at 5 times “Y” which is very close to the weighted average (5.5 times “Y”) of the peak and off-peak rates that would apply to a full day outage. The effect of the daily cap can essentially be achieved by retaining the 8 times “Y” and 2 times “Y” factors.

Establishing an effective seasonal cap is much harder. The cap is meant to limit the average outage rate for a facility to 1.8 times “Y” in a Hot Season and to 0.6 times “Y” in the Cold and Intermediate Seasons.

The problem is determining how the refund rate can be switched from the level applicable to a trading interval to the level applicable for a season while meeting the refund objectives.

The required result is shown in Figure 1 below. This shows the level of outages that would be incurred by a facility that experiences a full outage for a whole Hot Season. Initially, the refunds are incurred at a high rate but, at some point, the rate is reduced so that the total refund over the full season is equal to the Seasonal Cap level in the current Market Rules.

Figure 1 – Hot Season Refunds
 (“Y” is set at \$1.00 per Trading Interval. Facility Capacity = 1 MW)



The most promising approach was to:

- Determine the maximum refund that would be paid over the full season.
- Aggregate the refunds (being incurred at the high rate) until some proportion of the full seasonal amount has been refunded.
- Switch to a lower rate that makes the total refund equal the seasonal cap.

This works quite well for full outages and, as seen in the figure, the refund rate switches across to a lower rate (after about 20 days of full outage in this example).

However, if the facility has a partial outage, the period during which the high rate applies is correspondingly longer. If the facility has a 50% outage, the higher refund rate will then apply for around 40 days (in this example) before the lower refund level switches in. This means that the total refund level is somewhat greater than 50% of the seasonal cap.

The direct implication of this is that a 100 MW facility that experiences a 50% outage would pay higher refunds than a 50 MW facility that has a 100% outage. This is considered in appropriate.

This approach also gives the undesirable outcome that a facility which experiences a different pattern of outages will face different refunds even though the total outage is the same. For example, a facility that experiences a 50% outage for the first month of the Hot Season and a full outage for the last month will make a different refund to an identical facility in which the outages are reversed.

After considerable analysis, the Working Group concluded that it does not appear possible to fully address all of these issues within this approach and therefore developed an alternative.

5. ALINTA SALES' INTERPRETATION OF THE MARKET RULES

The refund table in the Market Rules uses the term "\$ per average MW shortfall per Trading Interval over a Season" and Market Rule 4.26.3 (b) defines the refund level as "the Maximum Seasonal Rate determined in accordance with the Refund Table, multiplied by the average Trading Interval Capacity Shortfall". Alinta Sales has suggested that the average outage should be measured over the trading intervals in which outages occur rather than over all Trading Intervals in the Season.

By way of example, if a facility had a 100 MW outage for 20% of the season, the the average shortfall currently determined through the Market Rules would be 20 MW per trading interval. The Alinta Sales interpretation is that the average shortfall is 100 MW per trading interval in which outages occur.

The Working Group has not addressed the correctness of either interpretation.

A significant issue associated with Alinta Sales' suggested interpretation is that the level of refund that applies to any particular outage depends on the outage history, to date, and future outages. The refund applicable for, say, a full outage will be reduced if the facility has already experienced a partial outage (because the average outage level will be below 100%). As stated in the previous sections, this was deemed to be an undesirable outcome.

6. REFUND STRUCTURE PROPOSED BY THE WORKING GROUP

The major issues with the original concept arise from the change in refund rate associated with the seasonal cap. The mechanism is much simpler if a single rate is applied to each season or part of season. So the main elements of the alternative approach are:

- A single refund rate applies in all peak trading intervals of the season (or part).
- A second refund rate applies to all off-peak trading intervals in the season.
- There are no specific seasonal caps.
- An annual cap is retained and this is equal to the amount of reserve capacity payments made to a facility.

In the current Market Rules, different refund rates apply to peak and off-peak trading intervals (ie daily). This provides the opportunity to balance the refund levels over the different trading intervals. To reduce the total level of refunds, while maintaining appropriate performance incentives, this differentiation concept has been taken further in this proposal through two other changes.

The first change is that a differentiation is made between business days and non-business days, (weekends and public holidays). The maximum demand on non-business days is generally well below that on adjacent business days so the impact

of any outage is likely to be less severe. For this reason, it is proposed that a different refund rate apply to peak trading intervals (8 am to 10 pm) on non-business days.

The second change is that a distinction is made between the first and second halves of the Hot Season. Because of school and public holidays, there is a significant difference in peak demands which occur in December and January and those occurring in February and March. It is proposed that this be reflected by having different refund rates apply to the first and second halves of the Hot Season.

Table 1 shows a set of refund levels that have been developed by the Working Group as the basis for discussion. They have been developed such that:

- They recognise the inherent difference in system risk between the various portions of the year and between peak and off-peak periods.
- The maximum payment that would accrue for a full outage lasting for a full season is generally in line with the current seasonal caps.
- A facility that has a full outage from the start of the Capacity Year will not reach the annual cap until the end of the Hot Season.

Table 1. Possible Refund Levels

Season	Intermediate	Early Summer	Late Summer	Cold
Dates	1 Oct to 1 Dec	1 Dec to 1 Feb	1 Feb to 1 Apr	1 Apr to 1 Oct
Peak trading interval rate (Business days)	1.5 x Y	4 x Y	6 x Y	1.5 x Y
Peak Trading Interval Rate (Non-bus days)	0.75 x Y	1.5 x Y	2 x Y	0.75 x Y
Off-peak trading intervals	0.25 x Y	0.5 x Y	0.75 x Y	0.25 x Y

Table 2 shows the level of refunds that would be incurred by a facility that has a full outage for a full year if the refund levels in Table 1 were to be applied. (The refunds have been calculated on a monthly basis for convenience only).

Table 2. Out Workings of Revised Refund Rates (for 2007/08)

Month	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
No of days	31	30	31	31	29	31	30	31	30	31	31	30
No of Business Days	22	22	19	21	21	20	20	22	20	23	21	22
No of non-bus days	9	8	12	10	8	11	10	9	10	8	10	8
Refund rates per Trading Interval												
Business days Peak Tis	1.50	1.50	4.00	4.00	6.00	6.00	1.50	1.50	1.50	1.50	1.50	1.50
Non-Bus days Peak Tis	0.75	0.75	1.50	1.50	2.00	2.00	0.75	0.75	0.75	0.75	0.75	0.75
All days Off-peak Tis	0.25	0.25	0.50	0.50	0.75	0.75	0.25	0.25	0.25	0.25	0.25	0.25
Average refund (for continuous full outage)												
Average for business day	0.98	0.98	2.54	2.54	3.81	3.81	0.98	0.98	0.98	0.98	0.98	0.98
Average for non-bus day	0.54	0.54	1.08	1.08	1.48	1.48	0.54	0.54	0.54	0.54	0.54	0.54
Average for month	0.85	0.86	1.98	2.07	3.17	2.98	0.83	0.85	0.83	0.87	0.84	0.86
Average for part season				2.02		3.08						
Average for Season		0.86				2.55						0.85
Cummulative for year	0.07	0.14	0.31	0.48	0.74	0.99	1.06	1.13	1.20	1.28	1.34	1.42

The three lines highlighted in yellow show the refund rates that would apply in each Trading Interval. These are taken directly from Table 1. This shows the three rates that apply to:

- Business day peak Trading Intervals.
- Non-business day peak Trading Intervals.
- Non-peak Trading Intervals (for both business and non-business days).

The two lines highlighted in green show the average refund rate that would apply to a facility that has a forced outage extending for a full day. The current provisions of the Market Rules have a maximum daily refund rate which is capped at 5 times “Y”. Under the proposed arrangement, the maximum daily refund is reduced:

- On business days in the Hot Season the daily maximum refund would be 2.5 times “Y” for December and January and nearly 4 times “Y” for the February and March.
- The maximum refunds for a full outage on non-business days would be 1.1 times “Y” or 1.5 times “Y”.

The three figures highlighted in blue show the average refund level that would apply to a facility that has a forced outage which lasts for a full season:

- 0.9 times “Y” for an outage that lasts the full Intermediate Season.
- 2.5 times “Y” for an outage lasting the full Hot Season.
- 0.9 times “Y” for an outage lasting the full Cold Season.

These refund rates are a little higher than the seasonal caps that are in the current Market Rules.

The last line on the table shows the accumulation of refunds that would occur if a facility has a forced outage that commences at the start of the capacity year and

continues through the whole year. The figure highlighted in orange shows the month in which the refund would reach the annual cap. This shows that the annual cap would be reached sometime during April, ie into the Cold Season.

The key results of adopting these refund rates would be:

- The requirement for reliability during February and March is appropriately emphasised.
- Refunds for a facility that experiences a very long outage will still be capped at the same annual maximum.
- The issues associated with equitable treatment of partial outages will be resolved.
- The amount of refunds incurred by generators that have few, or shorter, forced outages will generally be lower than was originally intended under the Market Rules.
- The level of refunds for facilities that experience extended outages will tend to be higher and may well exceed the level of the Seasonal Caps that are in the existing Market Rules.

7. RECOMMENDATIONS

It is recommended that the Market Advisory Committee endorse the proposed market refund structure that comprises:

- Specific refund rates for peak and off-peak Trading Intervals (as now).
- Specific refund rates for the Hot, Cold and Intermediate Seasons (as now).
- An annual cap (as now).
- Specific refund rates for business days and non-business days (new).
- Specific refund rates applicable to the first half and second half of the Hot Season (new).
- Removal of the daily and seasonal caps (new).

It is recommended that the Market Advisory Committee consider the specific refund rates in Table 1 and provide direction to the Working Group to finalise these.

Appendix 1 - Terms of Reference

The Reserve Capacity Refund Mechanism Group

SCOPE

The Reserve Capacity Refund arrangements need to be better aligned with the Market Objectives and the original intent of the Reserve Capacity Refund concept. The IMO has prepared a discussion paper that outlines the issues with the current Market Rule provisions and has put forward some alternative arrangements for consideration.

In order to propose an alternative set of refund arrangements, the Working Group is requested to:

- Assess and propose key drivers for the Capacity Refund Mechanism.
- Assess, amend and propose a set of Outage Scenarios to be used for a quantitative analysis.
- Conduct quantitative analysis of Outage Scenarios against the Capacity Cost Refund mechanism alternatives.
- Complete preliminary qualitative analysis of each Capacity Refund mechanism alternative.
- Assess and propose an alternative Capacity Refund mechanism.
- Prepare a report proposing a revised refund arrangement, by end April 2007.

The output of the Working Group will be a Report to MAC which provides a recommended refund arrangement and demonstrates that the proposed change will further the achievement of the Wholesale Market Objectives.

MEMBERSHIP AND PROCESS

- Members of the Working Group are appointed and substituted by MAC.
- The members of the Working Group are:

Patrick Peake (Chair)	-	IMO
Brendan Clarke	-	System Management (former Chair of the ACAP Group)
Phil Kelloway	-	System Management
Mark McKinnon	-	Industry Representative, Alinta
Paul Key	-	Industry Representative, Premier Power
Ky Cao	-	Industry Representative, Perth Energy
Andrew Sutherland	-	Industry Representative, Transalta
Sarah Kok	-	Synergy Representative
Brad Huppertz	-	Verve Representative
Dora Guzeleva	-	IMO

- The Working Group must meet the timeframes set by the MAC Chairperson, including by providing a report proposing a revised refund arrangement, by end April 2007.
- The Working Group will focus on Market Rules 4.26.1 and 4.26.3
- The Working Group will refer any other issues the Group encounters during its operation back to MAC for consideration

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- Members are expected to attend as many Working Group meetings as practicable.
- MAC may review, amend and extend these terms of reference, as necessary.

Appendix 2 – Market Rules

Market Rule 4.26.1

4.26.1. If a Market Participant holding Capacity Credits fails to comply with its Reserve Capacity Obligations then the Market Participant must pay a refund to the IMO calculated in accordance with the following provisions.

REFUND TABLE

Season	Cold	Intermediate	Hot
Dates	1 April to 1 October	1 October to 1 December	1 December to 1 April
Off-Peak Trading Interval Rate (\$ per MW shortfall per Trading Interval)	$2 \times Y$	$2 \times Y$	$2 \times Y$
Peak Trading Interval Rate (\$ per MW shortfall per Trading Interval)	$8 \times Y$	$8 \times Y$	$8 \times Y$
Maximum Daily Rate (\$ per average MW shortfall per Trading Interval over a Trading Day)	$5 \times Y$	$5 \times Y$	$5 \times Y$
Maximum Seasonal Rate (\$ per average MW shortfall per Trading Interval over a Season)	$0.6 \times Y$	$0.6 \times Y$	$1.8 \times Y$
Maximum Refund	The total value of the Capacity Credit payments paid or to be paid under these Market Rules to the relevant Market Participant for the 12 Trading Months commencing at the start of the Trading Day of the previous 1 October assuming the IMO acquires all of the Capacity Credits held by the Market Participant and the cost of each Capacity Credit so acquired is determined in accordance with clause 4.28.2(b), (c) and (d) (as applicable).		
<p>Where:</p> <p>For an Intermittent Facility that has been commissioned: Y equals 0</p> <p>For all other facilities, including Intermittent Facilities that have not been commissioned: Y equals the greater of the Reserve Capacity Price and 85% of the Maximum Reserve Capacity Price for the relevant Reserve Capacity Auction expressed as a \$ per MW per Trading Interval figure.</p>			

Market Rule 4.26.3

- 4.26.3. For each Market Participant holding Capacity Credits, the IMO must determine the amount of the refund (“**Capacity Cost Refund**”) to be applied for Trading Month *m* in respect of a Capacity Shortfall as defined in clauses 4.26.2 during that Trading Month. The Capacity Cost Refund is the lesser of:
- (a) the Maximum Refund determined in accordance with the Refund Table, less all Capacity Cost Refunds applicable to the Market Participant in previous Trading Months falling in the same Capacity Year as Trading Month *m*; and
 - (b) the Maximum Seasonal Rate determined in accordance with the Refund Table, multiplied by the average Trading Interval Capacity Shortfall calculated over the Season within which Trading Month *m* falls, less the sum of the Capacity Cost Refunds applicable to the Market Participant in previous Trading Months which fall in the same Season; and
 - (c) the sum of the relevant amounts for Trading Month *m*, where a relevant amount is calculated for each Trading Day *d* in Trading Month *m* and is equal to the lesser of:
 - i. the Maximum Daily Rate determined in accordance with the Refund Table for Trading Day *d* multiplied by the sum over all Trading Intervals *t* in Trading Day *d* of the Capacity Shortfall in Trading Interval *t*; and
 - ii. the sum over all Trading Intervals *t* in Trading Day *d* of the product of:
 - 1. the Off-Peak Trading Interval Rate or Peak Trading Interval Rate determined in accordance with the Refund Table applicable to Trading Interval *t*; and
 - 2. the Capacity Shortfall in Trading Interval *t*.