Independent Market Operator

REVIEW OF THE SWIS RELIABILITY CRITERIA

FINAL REPORT

November 2007

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EXECUTIVE SUMMARY

In accordance with the Market Rules, the IMO has recently commissioned a review of the Planning Criteria used to determine the required level of reserve capacity within the South West Interconnected System (SWIS). The work was undertaken by CRA International (CRAI) and their report is published on the IMO website. The IMO's recommendations for changes to the Reliability Criteria were included within a Draft Report entitled "Review of the SWIS Reliability Criteria – Draft Report for Comment". This report was published on the IMO website along with an invitation for stakeholder comment.

The IMO did not receive any formal submissions in respect to this report but input was received from an Advisory Group which comprised representatives of industry and Government.

The CRAI report indicated that the current margin, measured in mega watts, is appropriate. However, the report suggested that the method of calculation should be changed to be "future proofed" so that the quantity is related to the forecast maximum demand on the system rather than the size of the largest generating unit as is used now. The report recommends that the base reserve margin, over the period through to 2011, should be set equal to 8.2% of the maximum demand that is forecast to occur once in ten years. The figure of 8.2% is equivalent to the existing requirement of reserve equal to the largest generator on the SWIS. Allowances for capacity to cover the requirements of interruptible loads and to provide for frequency control would be in addition to this base quantity.

It should be noted that the reserve margin of 8.2% is based on the capacity of generation and demand side management (DSM) being measured at a temperature of 41°C and comparing this to a maximum demand that is expected to only occur one year in ten. By contrast, commonly the reserve plant margin calculation in other jurisdictions differs from this in three key ways:

- It uses the nameplate rating as the capacity of generation.
- It uses the median or expected demand.
- It does not take into account demand side management.

If the figure of 8.2% reserve margin for the SWIS is recalibrated on this basis the margin is around 25% which compares well with figures used in other jurisdictions.

The IMO has now proposed changes to the Market Rules to incorporate the recommended change to the reliability criteria. It is anticipated that the proposed rule changes will be available for public comment from the end of November 2007.

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1. INTRODUCTION

1.1 Background

The Market Rules require the IMO to undertake a review, at least once every five years, of the planning criteria used to assess system reliability. The criteria which are set within the Market Rules were those that had previously been used by Western Power in preparing the Generation Status Review. In 2006, the IMO considered that it was therefore timely to undertake a review of the criteria, in parallel with a planned review of the processes used to forecast electricity demand.

The objective of the review of reliability criteria is to determine the most appropriate process for setting the reliability criteria given the physical composition of the power system and the electricity demand pattern in the SWIS. Fundamental to the review is an analysis of the balance that exists between reliability standards and the costs associated with procuring the capacity to satisfy those standards.

To ensure that stakeholder input was provided throughout the review process, an Advisory Group was established with representatives of industry and government. The composition of the Advisory Group is shown in the Appendix.

1.2 Market Rule Requirements in Respect to Review

In conducting a review, the IMO is required to invite submissions on the performance of the Planning Criterion [Market Rule 4.5.16]. This requirement was followed and the three submissions which were received and published on the IMO website.

The Market Rules [4.5.17] require the IMO to prepare a draft report containing:

- Issues identified by the IMO.
- Assumptions made by the IMO in undertaking the study.
- Submissions received by the IMO from Rule Participants in accordance with clause 4.5.16.
- The IMO's responses to issues raised in those submissions.
- The results of the technical and cost-benefit studies.

The IMO must make available a draft of this report to Rule Participants for comment and invite submissions. A final report must then be published [4.5.18] which includes the above information along with:

- The submissions on the draft report received by the IMO from Rule Participants.
- The IMO's responses to the issues raised in those submissions.
- Any recommended changes to the Planning Criteria.

The IMO published the Draft Report on its website in September 2007 and no formal submissions were received. The IMO, in discussion with the Advisory Group, has now prepared proposed changes to the Market Rules to give effect to the recommendations in the Draft Report. It is anticipated that these proposed rule changes will be available for public comment from the end of November 2007.

1.3 Detailed Review

Following a competitive tender process, CRA International (CRAI) was retained by the IMO to undertake a review of the planing criteria including to:

- Review of the practices in other power systems.
- Review and analyse the performance of existing and planned generation facilities.
- Assess factors that are specifically related to the SWIS.
- Recommend an appropriate reliability criterion.
- Determine and assess the commercial and system impacts on implementing any recommended changes to the criterion.

A copy of CRAI's final report was published on the IMO website.

1.4 Key Assumptions within the Study

The study has been supported by extensive power system modelling undertaken by CRAI. The key assumptions used within this modelling were:

- The forecast maximum demand and electricity consumption are as set out in the 2006 Statement of Opportunities Report (SOO) published in July 2006. This report is available on the IMO website at www.imowa.com.au.

- The forecast levels of scheduled and unscheduled generator maintenance are in accordance with the data used to develop the 2006 SOO. Data for individual generating units is confidential but aggregated data is provided within the CRAI report.

- The level of generation reserve is intended to cover outages that occur during the normal operation of the power system. It does not include an allowance for major system incidents, in particular, it does not address the issues of substantial fuel supply curtailments.

The Market Rules require that a review be undertaken at least every five years. As a consequence, this study only considers the period from 2007 through to 2011.

1.5 Report Structure

Section 2 of this report describes the existing reliability criterion and describes the issues that the IMO has identified.

Section 3 summarises the major points from the stakeholder submissions.

Section 4 summarises the key points of the CRAI report.

Section 5 discusses the various issues raised by the IMO, by stakeholders and in the CRAI Report and recommends an appropriate reliability criterion.

2. EXISTING RELIABILITY CRITERIA

The planing criterion within the Market Rules [4.5.9] that are used by the IMO to determine the reserve capacity requirement contains two separate elements. These are that there should be sufficient capacity to:

- Meet the forecast peak demand (including transmission losses and allowing for Intermittent Loads) supplied through the SWIS even after the outage of the largest generation unit and while maintaining the Minimum Frequency Keeping Capacity for normal frequency control. The forecast peak demand should be calculated to a probability level that the forecast would not be expected to be exceeded in more than one year out of ten.

- Limit expected energy shortfalls to 0.002% of annual energy consumption (including transmission losses). This criterion is sometimes referred to as "Expected Unserved Energy" or EUE.

The first of these criteria can be termed a "defined event scenario" in that it defines a single set of conditions which must be met by the capacity provided. The second criterion considers the effect of electricity usage spread over a full year.

Most of the generation capacity on the SWIS is able to operate throughout the whole year, apart from maintenance requirements. There is only a small quantity whose output is restricted by the availability of fuel or other limitations. If sufficient capacity is provided to meet the maximum demand, this plant should be able to fully meet the annual energy requirements. For this reason, the defined event scenario will generally set the requirement level.

There are some facilities, however, that are unable to provide energy on a continuous basis. Demand side management (DSM) is the most significant of these facilities in the SWIS. The EUE criterion is used to define limits on the maximum quantities of such facilities that can be accommodated.

2.1 Issues Identified by the IMO

The IMO identified a number of potential issues and these were outlined briefly in the invitation to stakeholders to provide submissions.

The most significant issue identified by the IMO in respect to these reliability criteria is that the "defined event scenario" is a static measure. It is linked to the size of the largest generating unit and this figure will not necessarily change as electricity demand grows. As a consequence, the reserve quantity measured as a percentage of the maximum demand may decrease over time.

As demand grows, and more generators are added to the system, there may come a time when allowing for the loss of the largest generating unit is insufficient. The decision must then be made as to when and how this static measure should be changed. A dynamic measure that is related to the amount of maximum demand, and possibly other measures, is likely to be more effective for the long term.

Other potential issues identified by the IMO are:

- The possibility that certification of large windfarms, being based on their average output, may not adequately reflect their contribution to system reliability at peak times.

- In the past, some generation capacity, such as that available from peak mode operation of gas turbines, had not been counted within formal capacity quantity measures. This “unaccounted” capacity provided an additional hidden reserve beyond the formal figure. With the introduction of the Reserve Capacity Mechanism, Market Participants have generally certified their full generator capacity, removing any hidden “additional” reserve available to the system and the reliability criterion must fully cover the requirements.

- The effectiveness of the contribution from demand side management facilities to system reliability.

3. STAKEHOLDER SUBMISSIONS

Three stakeholders provided submissions to the IMO in respect to the Review of the Reliability Criterion:

- Alinta Sales Pty.
- Synergy.
- Western Power (covering both Networks and System Management perspectives).

Copies of the full submissions, which also provide comment on the parallel review of the forecasting processes, are provided in Appendix 2. The main issues raised in these submissions were:

- The current approach of using the largest generator on the system as the basis for system reserve is prudent and any increase beyond this would need to be supported by conclusive evidence. If anything, it could be seen, when combined with a 1-in-10 year load forecast, as being too conservative. The reliability criterion should not try to mitigate all potential types of potential capacity shortfall situations. It may even be appropriate to reduce the required reserve margin by taking account of any available interruptible loads that are not included within the reserve capacity mechanism.

- Because the size of the largest generating unit does not necessarily change with increases in system maximum demand, a reliability criteria based on a percentage of peak demand may be more suitable.

- As older generation capacity is replaced by newer facilities, which have higher reliability, consideration should be given to reviewing the overall reserve capacity requirement.

- While it is possible that windfarms and other intermittent generators may have an impact on system reliability, there is not yet sufficient data to identify this to the level required to make changes to the reliability criterion.

- Similarly, there has not been sufficient experience with DSM to draw firm conclusions as to its effectiveness. There is a concern that allowing a facility to provide spinning reserve as well as counting it as DSM is not appropriate. The IMO contends, however, that t*his is valid because the reliability criterion does not provide for any spinning reserve to be available the system peak. Any facility that is contracted to provide capacity for spinning reserve is therefore able to offer this capacity as DSM at the peak.*

- It is suggested that the reliability criterion should be based on the 1-in-2 year forecast rather than the 1-in-10 year forecast because the former is possibly more stable (being based on a larger data set).

These issues are discussed in Section 5 of this report.

4. SUMMARY OF CRAI REPORT

4.1 General Approach

CRAI's approach to the development of the reliability criterion had a number of discrete, though interrelated steps.

- The first step was to determine the appropriate type of measure to be used for setting the reliability standard within the SWIS.
- Once this was settled, a comparison was made with criteria used in other power systems in Australia and overseas.
- Because of the impact of generator outages on system reliability, the performance of generators on the SWIS was compared with those on other power systems.
- Detailed power system modelling was then undertaken to assess the impact of changes to key features of the SWIS (eg maximum demand, generator performance, fuel supply).
- The value to customers of various reliability levels was then estimated.

4.2 Measures of Reliability

CRAI note that it is common practice for standards to be set to ensure that the risk of not meeting customer demand is within acceptable limits. This is because it is not cost effective to build a perfectly reliable power system in which there is no risk of interruption to supply. CRAI identify a number of characteristics that are commonly used to describe the reliability of supply:

- Frequency – how often an interruption may occur.
- Duration – how long an interruption lasts or the total length of all interruptions over a period.
- Depth – the amount of capacity shortfall measured in MW or the accumulated amount of energy not supplied measured as a percentage of total demand.

In discussing the level and form of criterion CRAI state that *"the form in which the Planning Criterion is expressed is important because it determines which characteristics of reliability of supply will be the primary focus, and which will be consequential." [Page 2]*

As has already been determined by the IMO, CRAI note that *"Our analysis shows that the defined event requirement is the dominant of the two requirements in the current criterion under all likely operating conditions. This is a direct result of the highly temperature-sensitive nature of consumer demand on the SWIS and above average performance of the generating plant currently on the system." [Page 2]*

CRAI identified a major draw back of the defined event criteria in that *"although it is currently delivering a cost effective level of reserve, a limitation on the use of the current defined event scenario is that it relates directly to depth of interruption only at peak, and therefore refers only indirectly to other times. As the profile of customer demand, generator and customer technology mix and costs change over time the current criterion will eventually deliver a different but uncertain level of reliability to customers and result in uncertain economic impact." [Page 2]*

The use of the EUE criterion is not supported because it does not relate directly to the reserve capacity mechanism that is a feature of the WEM. *"On the other hand, expressing a reliability criterion in terms of EUE is not a common practice internationally. The primary example of an EUE based standard is the National Electricity Market (NEM) in the eastern and southern states. Use of the EUE standard in the NEM is consistent with the "energy only" design of that market, but this is a very different design of market to the WEM." [Page 2]*

CRAI summarises their assessment by noting that many utilities have a reliability criterion that is based on a maximum frequency of outage. *"Internationally the more common criteria are based more specifically on either the frequency or duration of interruptions, for example that there must be no more that one incident of interruption (without specifying either depth or duration) in a specified number of years. A number of very large systems in the US target no more than 1 such event in 10 years, but this is for much larger and relatively closely interconnected systems than the SWIS. It is also the case that the widespread use of frequency or duration measures elsewhere may relate more to a lack of need to change from traditional (pre-market) approaches than to any specific (post-market) requirement or feature." [Page 3]*

4.3 Reliability Criteria in Other Systems

CRAI document the reliability criteria for a range of international utilities. The report notes that *"the most common parameters to measure reliability used internationally are based on the frequency of any shortfall in capacity to meet demand and the number of hours of shortfall – very similar to the LOLH [Loss of Load Hours] measure previously [ie during the 1980s and 1990s] used in the SWIS." [Page 15]*

CRAI note that it is difficult to directly compare systems but that some broad comparisons can be made. The report concludes that *the minimum unserved energy requirement in the SWIS Planning Criterion is broadly comparable to that in the Australian NEM and internationally, especially for systems of similar size." [Page 15]*

4.4 Generator Performance

CRAI reviewed the performance of the generators within the SWIS, with respect to scheduled and unscheduled maintenance. CRAI concluded that

- "*Performance of units in the SWIS generally compares well with performance of units in the NEM and New Zealand electricity market. Coal and cogeneration units appear to be more reliable than those in other markets and these units account for a large share of the generation in the SWIS; and*

- *Compared to unit outage rates from GADS data [North American Generator Availability Data System] outage rates in the SWIS are significantly less over all technologies. GADS data covers a long history for a large set of generators and provides a well-established benchmark." [Page 23].*

It was also noted that "*Even if plant performance in WA does regress towards the mean, the implied performance deterioration is unlikely to occur overnight. Furthermore, the capacity credit arrangements in the WA market design create a relatively strong commercial incentive to deliver the capacity that participants declare to the IMO. Consequently, we consider it reasonable to incorporate performance assumptions that align with recent plant performance" [Page 23].*

The report suggests that "*Routine recalculation can be used to adjust the margin if performance falls" [Page 23].*

4.4 Value of Reliability to Customers

CRAI has undertaken cost benefit analysis to assess the community benefits that would result from any change in reliability standards. Reliability can be enhanced by the installation of more generation capacity and the capital cost of this can be readily calculated. This new capacity will most likely have lower operating cost than some older plant and these benefits can be estimated through modelling.

The most difficult part of any cost benefit analysis is placing a value on supply reliability because the value will depend heavily on factors such as:

- The type of customer facing the potential supply interruption.
- The amount of notice provided of any interruption.
- The duration of any outage.
- The frequency of interruptions.

This variability is shown in a 2002 study by VENCorp, quoted by CRAI, which estimated that the value which customers place on reliability varies within the range of $10,000 to $50,000 per MWh. The average figure from this study was $29,600 per MWh. [CRA, Assessment of the Value of Customer Reliability].

By comparison, the Value of Loss Load in the NEM, which is a proxy for the value placed on reliability by customers, is $10,000 per MWh though there has been some discussion on raising this to $20,000 per MWh.

In the absence of any published figures as to the value of reliability in Western Australia, CRAI has used the range indicated by the VENCorp study. This is considered to be sound approach.

CRAI has estimated that over the five year study period of 2007 - 2011, in the SWIS, *"the overall industry costs increase by about $8.6 to $15.3 million for every 50 MW increment of reserve". [Page 48]*

4.5 Intermittent Generators

In determining an appropriate reserve margin, CRAI state that their approach *"does, however, presume that the IMO will utilise physical realisable generator capacity and performance parameters in all cases. If for policy or administrative reasons the capacity credit allowances do not align with physically realisable capacity, which we understand is currently the case for wind generation, the difference should be ignored and the physically realisable capacity used in order to avoid distorting the calculation of reserve." [Page 6]*

At present, the IMO certifies all intermittent generation in accordance with their average output over the three years up to, and including, the previous Hot Season. [4.11.3A]. Because the three large wind farms at Albany, Emu Downs and Walkaway, are relatively new, only limited data is available in respect to their performance at times of system peak demand. It is noted, however, that preliminary information from the 2006/07 Hot Season, indicates that actual average production

during peak times was similar to the level of capacity credits that have been assigned.

4.6 Summary

CRAI's major conclusion is that no change is required to the level of reliability currently used within the SWIS. The report states that:

"Our review has found that in the absence of major external restrictions on plant operation or fuel supply, the current Planning Criterion delivers outcomes that are:

- *Broadly consistent with reliability provided by international systems of the size and characteristics of the SWIS; and*
- *Consistent with what is known about customer valuations of reliability.*

Therefore there is no obvious reason for change to the underlying level of reliability delivered by the generation sector under the current planning criterion. [Page 3]

However, while the current reserve margin of 315 MW is very close to CRAI's estimated requirement of 320 MW, the Report concludes that changes should be introduced to "future proof" the requirement.

"Although we see no reason to change the underlying level of reliability, we believe there is scope to refine the Planning Criterion to more robustly and transparently accommodate future changes in economic, commercial and technical conditions and more directly link future levels to consumer valuations. This will also provide a sounder basis for future judgements, where these are necessary.

In the future the Planning Criterion should be expressed in two parts as follows:

- *A "Basic Requirement" developed consistent with conservative estimates of the value consumers place on reliability over a year using an EUE basis, compared to the cost of providing reserve; and*
- *Additional Requirement(s), if needed to limit the frequency, duration or depth of individual outages in the event that any of these would likely be unacceptable if reserve were set only in accordance with the Basic Requirement." [Page 3 & 4]*

CRAI suggest that these Additional Requirements should, ideally, be determined by further cost benefit analysis but note that this is not a practical approach because the basic data for the value of reliability in Western Australia does not exist. CRAI suggest that *"a policy based adjustment to reserve based on judgements about the value to consumers of achieving different levels of frequency and duration of interruptions should be used". [Page 4]*

4.6 CRAI Recommendation

CRAI recommends that during the next five years the reserve margin based on loss of the largest generating unit should be replaced by *"a Basic Requirement of 320 MW (rounded) or a reserve margin of 8.2% (10% POE) for average peak demand across the study period would be cost effective." Page 8]*

To this figure, further quantities must be added to cover load following reserve and any additional reserve to cover defined levels of frequency or duration of outages.

"On this basis and applying the relationships found in the study the overall reserve requirement (R) for the period to 2011 can be expressed as:

R = 8.2% peak demand (10% POE)
+ Additional Reserve for frequency, duration or depth of interruption
+30 MW system regulating reserve [Page 8]

CRAI indicate that no Additional Reserve is required over the next five years *"unless it were also be decided that, as a matter of policy, that the current frequency, duration or depth of interruption is excessive"*.

4.7 Comparative Reserve Plant Margins

This reserve capacity margin calculation in the SWIS differs from that typically used by other jurisdictions. These significant differences are:

- Nameplate rating of all generation is commonly used rather than the 41°C rating.
- The maximum demand is taken as the expected, or median load. (For the SWIS, this means using the 50% rather than the 10% load).
- Demand Side Management is excluded.

Table 1 shows the value of the reserve margin in 2007/08 when calculated on this different basis.

Table 1 – Comparison of Reserve Plant Margin Calculations

2007/08	IMO Basis	Common Basis
Generation capacity	3,984	4,507
DSM Capacity	131	0
Total capacity	4,115	4,507
Maximum Demand	3,800	3,521
Reserve Margin	**8.3%**	**28.0%**

Table 2 shows a comparison between the SWIS reserve margin and the planning margin used in the National Electricity Market (NEM) and in two systems in the USA.

Table 2 – Reserve Plant Margins in the SWIS, NEM, PJM and New York

International Comparisons	Reserve Margin
National Electricity Market (Australia)	Approx 15%
PJM (US)	Approx 15%
New York (US)	Approx 15 – 18%
SWIS (WA)	Approx 25 - 28%

It can be seen that the margin proposed for the SWIS, when compared on a common basis, is substantially higher than the levels used in the NEM and in the US. This difference reflects the isolated nature of the SWIS compared to the strongly inter-connected nature of the other systems.

5. DISCUSSION

5.1 Type of Reliability Criteria

The work undertaken on this study confirms that the key requirement for system reliability on the SWIS is to have sufficient reserve capacity to meet the maximum demand. This criterion is more arduous than the annual energy requirement (EUE) under all expected situations.

The existing criterion, which is based on the size of the largest generating unit, is not sufficiently responsive to changes in the level of maximum demand. While it may be assumed that the size of the largest generator will increase as demand increases, this is not guaranteed. The payment mechanism for spinning reserve and the low overnight system demand are strong incentives to limit generator size. This is exemplified by Griffin's decision to size the Bluewaters units at 200 MW (nominal).

There is an argument for consideration to be given to including a component in the reserve margin that relates to the expected depth and duration of future system shortfalls. However, this would require extensive modelling as well as data on the value of customer reliability, required to determine the economic level of such outages, which is not available. CRAI recommend that such analysis should be undertaken when the reserve requirement is recalculated for the period beyond 2011.

The EUE criterion should be retained as a secondary measure because this is used to determine the level of DSM that can be accommodated on the system. This measure will also be relevant if there are proposals for generation facilities whose output is restricted by fuel limitations or technical constraints.

5.2 Quantity of Reserve Requirement

CRAI has recommended that the reserve requirement should be 320 MW, or a reserve margin of 8.2% of the average peak demand over the study period. (Using the 1-in-10 year peak demand). The table below shows the reserve requirement in each year, from 2007/08 through to 2011/12, using the existing "largest unit" criterion and the 8.2% criterion.

Table 3 – Reserve Margins

	Current Criterion	Proposed Criterion
2008/09	320 MW	335 MW
2009/10	320 MW	347 MW
2010/11	320 MW	358 MW
2011/12	320 MW	369 MW

It can be seen that this change to the criterion would raise the reserve requirement in each year of the study period. This reflects the fact that the margin would be set as a proportion of the maximum demand rather than being a static figure. However, the closeness of the new reserve requirement to the existing figures, during the initial years, confirms some stakeholders' opinions that the existing margin is appropriate.

Based on a reserve Capacity Price of around $100,000 per MW per year, changing to the proposed criterion would raise the total cost of capacity credits in the market by approximately $1.5 million in 2008/09 increasing to around $5 million in 2011/12.

This would be an increase of approximately 0.6% in the total cost of capacity credits and, in view of the small proportionate increase, the IMO supports the proposed change.

One stakeholder suggested that applying the reserve margin to the 1-in-10 year forecast is a double contingency whereas much of the power system is designed to accommodate only single contingency situations. It is suggested that the reliability criterion should consider the loss of the largest generator occurring during a 1-in-2 year set of weather conditions.

This is not strictly true. A double contingency event is one where two random events such as transmission line faults, both of which have a very low probability, occur simultaneously. On the other hand, a 1-in-10 year set of weather conditions is an expected event and the likelihood of occurrence is substantially higher than, say, the risk of a major transmission line trip.

Further, during a hot year, 1-in-10 year weather conditions may occur frequently and may have a long duration. There is, therefore, is a significant likelihood of a substantial generator outage coinciding with these high temperature conditions. For this reason, the IMO considers that the 8.2% reserve margin should be applied to the 1-in-10 year forecast maximum demand figure, as now, rather than being applied to the 1-in-2 year forecast maximum demand.

An alternative raised by a stakeholder was for a (larger) margin to be applied to the 1-in-2 year forecast as this may be more accurate than the 1-in-10 year forecast. The 1-in-10 year forecast gives a better indication of the highest level of maximum demand that could reasonably be expected to occur. For this reason, the IMO prefers that this remain as the key forecast measure and that the reserve margin be linked to this figure.

5.3 Intermittent Generators

The IMO, CRAI and stakeholders have all raised the issue of the contribution of large windfarms towards the reserve requirement at peak demand times. The amount of data currently available is not considered sufficient to undertake analysis to the level required to justify any proposals to change the present arrangements. The situation will be monitored closely through the forthcoming Hot Seasons.

5.4 Inclusion of Capacity that was not Previously Accounted

It is noted that, in the past, there has been capacity available to the system that was not included in the reserve requirement calculations. The establishment of the reserve capacity mechanism has encouraged Market Participants to certify all capacity to maximise their capacity credit revenue. Much of this previously unaccounted capacity is being certified and assigned capacity credits.

The modelling undertaken by CRAI took full account of the capacity actually available for service in determining the required reserve level. The recommended reserve margin is sufficient to meet the reserve capacity target without having to call on any unaccounted capacity.

It should be noted, however, that the two year lead time for certification means that there may be capacity in place that has not been assigned capacity credits. The IMO anticipates that there will be additional some capacity, resulting from generator upgrades, in place through 2008/09 and this could also occur in subsequent years.

5.5 Demand Side Management

Several issues relating to DSM have been raised by stakeholders. DSM should be encouraged to fulfil its appropriate role within the market but it is important that it provides effective capacity support as and when required. Although the amount of DSM on the system is significant, its actual use has been quite limited. The IMO plans to initiate a review of the appropriate operational conditions that should apply to DSM to enable it to effectively provide capacity support within the SWIS.

5.6 Changes in Plant Performance

Changes in the levels of scheduled and unscheduled plant outages may change the optimum reserve capacity requirement (either up or down). As noted by CRAI, such changes are likely to take place over an extended period rather than suddenly. CRAI has provided a mechanism by which the impact of changes in plant availability can be estimated. The IMO will continue to monitor generator performance.

6. RECOMMENDATIONS

It is recommended that:

- The Planning Criteria used to determine the reserve capacity requirement be based upon a percentage margin above the forecast maximum demand rather than the current margin equal to the largest generating unit.

- The margin to be used for the Planning Criterion should be 8.2% above the one year in ten forecast maximum demand for the next five years.

- An additional margin should continue to be included over the next five years to cover the potential demand from intermittent loads and to cover the minimum frequency keeping requirement.

- The capacity of intermittent generation should continue to be included as is currently set in the Market Rules (ie based on the average output over the previous three years).

- A review of the appropriate operational conditions that should apply to DSM to enable it to effectively provide capacity support within the SWIS should be undertaken separately by the IMO.

- The existing energy shortfall component in the Planning Criteria should be retained as a second criteria to determine the appropriate level of DSM or other facilities that have a limited energy output capability.

7. PROPOSED CHANGE TO THE MARKET RULES

The IMO is proposing that the following changes be made to Clause 4.5.9 of the Market Rules:

"*The Planning Criterion to be used by the IMO in undertaking a Long Term PASA study is there should be sufficient capacity in each Capacity Year during the Long Term PASA Planning Horizon to:*

(a) meet the forecast peak demand (including transmission losses and allowing for Intermittent Loads) supplied through the SWIS ~~even after the outage of the largest generation unit~~ plus a reserve margin equal to the greater of 8.2% of the forecast peak demand or the maximum capacity, measured at 41°C, of the largest generating unit and while maintaining the Minimum Frequency Keeping Capacity for normal frequency control. The forecast peak demand should be calculated to a probability level that the forecast would not be expected to be exceeded in more than one year out of ten; …"

Appendix – Composition of the Advisory Group

Organisation	Representative
Alinta Sales	Mark McKinnon
Chamber of Commerce and Industry WA	Jessica Shaw
Griffin Energy	Shane Cremin
Independent Market Operator	Patrick Peake
Independent Market Operator	Troy Forward
Office of Energy	Matthew Martin
Synergy Energy	Stephen MacLean
Verve Energy	Andrew Everett
WA Chamber of Minerals and Energy	Rob Swan
Western Power (Networks)	Peter Ang
Western Power (System Management)	Murray Caston

Note: The Department of Treasury and Finance declined an invitation to join the Advisory Group.