INDEPENDENT MARKET OPERATOR

ERA Submission
Proposal for Allowable Revenue and Forecast Capital Expenditure
1 July 2013 to 30 June 2016

November 2012

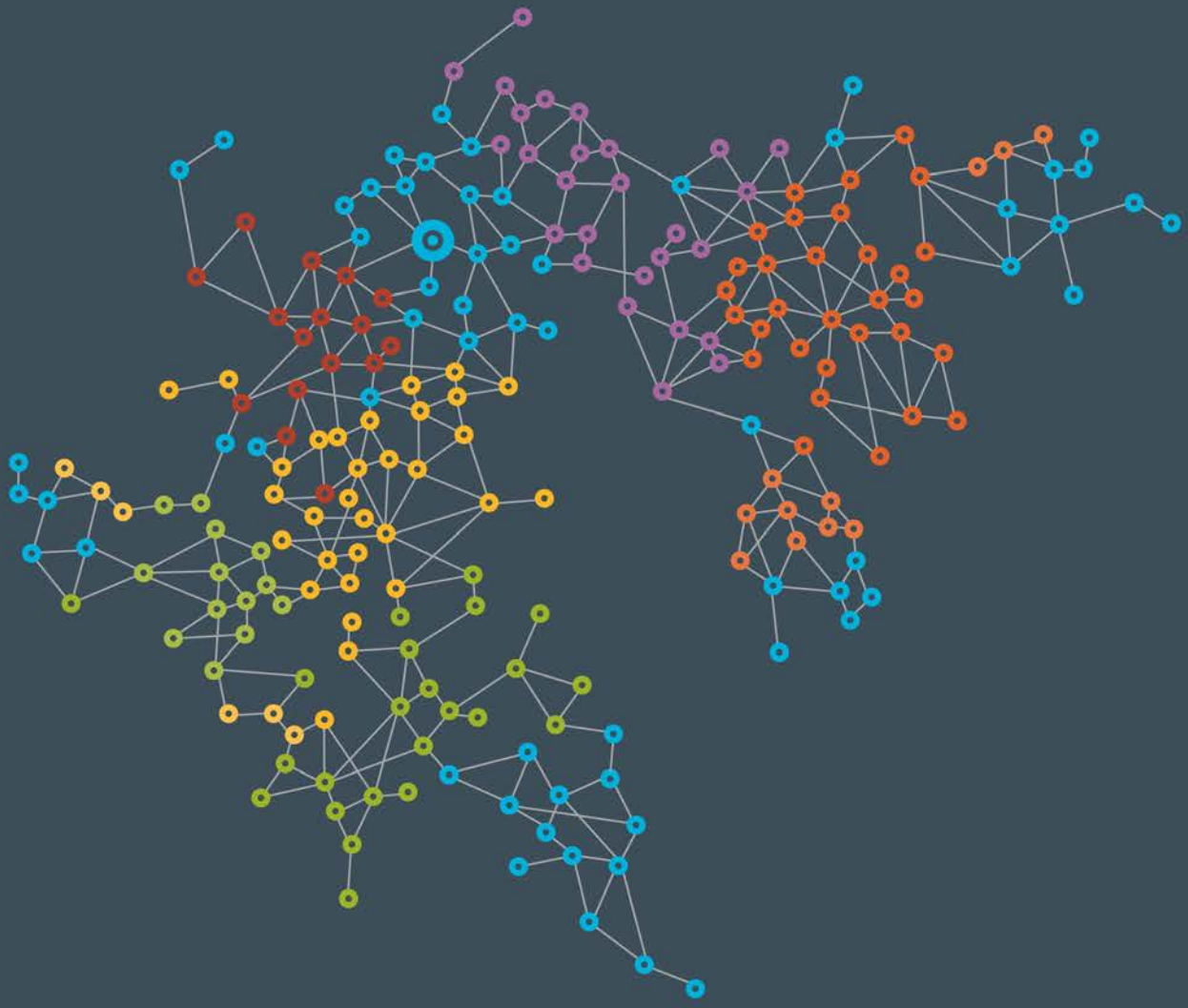


TABLE OF CONTENTS

Independent Market Operator
Level 17 Governor Stirling Tower
197 St Georges Terrace
Perth WA 6000

PO Box 7096
Cloisters Square
Perth WA 6850

T +61 8 9254 4300
F +61 8 9254 4399
E imo@imowa.com.au
W http://www.imowa.com.au

Executive Summary

In accordance with the Wholesale Electricity Market Rules, the Independent Market Operator (IMO) seeks approval from the Economic Regulation Authority (ERA) for the IMO's Allowable Revenue and Forecast Capital Expenditure for the three-year Review Period commencing 1 July 2013.

This submission constitutes the IMO's third Allowable Revenue submission, and has been expanded for the first time to also include a submission for the IMO's Forecast Capital Expenditure.

The IMO is seeking Allowable Revenue across the three-year Review Period of $48.776 million. This represents an increase of $7.870 million or 19% on the approved Allowable Revenue for the current Review Period.

After adjusting for abnormal items between the two Review Periods, the increase reduces to $1.137 million or 3.2%. This compares to an effective indexation factor between the two Review Periods of 9.6%.

The IMO business changed considerably on 1 July 2012 with the introduction of the new Balancing and LFAS Markets. This submission includes the resourcing requirements needed to support the new arrangements.

In addition, the IMO has also made allowance for the resources to operate the Gas Information Services (GIS). While not directly impacting this submission, a portion of the IMO's management costs and overhead is allocated to this activity. It is expected that the IMO's GIS activities will be subject to a similar Allowable Revenue approval conducted by the ERA.

The Market Fee Rate impact of this submission sees the underlying fee rate progressively reduce in nominal terms across the Review Period, from 0.458 $/MWh in 2012/13 to 0.437 $/MWh in 2015/16.

After adjusting for indexation, the underlying fee rate reduces in real terms from 0.458 $/MWh in 2012/13 to 0.397 $/MWh in 2015/16.

In summary, the IMO is seeking approval of its Allowable Revenue and Forecast Capital Expenditure across the three-year Review Period as set out below:

	2013/14	2014/15	2015/16
Allowable Revenue ($'000)	15,825	16,265	16,686
Forecast Capital Expenditure ($'000)	2,583	1,984	1,707

1. Introduction

In accordance with Rule 2.22.3 of the Wholesale Electricity Market Rules (Market Rules), the Independent Market Operator (IMO) must seek approval of its Allowable Revenue and Forecast Capital Expenditure from the Economic Regulation Authority (ERA) for the Review Period, for each of the services listed in Rule 2.22.1.

These services are defined as:

- Market Operations;
- System Planning (Capacity Planning); and
- Market Administration.

The IMO budget is based on the costs that would be incurred by a prudent provider of the defined services, acting efficiently, while effectively promoting the Wholesale Electricity Market Objectives.

The purpose of this submission is to provide relevant information to the ERA for it to assess and approve the IMO's Allowable Revenue and Forecast Capital Expenditure for the Review Period 1 July 2013 to 30 June 2016.

The ERA must determine the Allowable Revenue and Forecast Capital Expenditure of the IMO for the Review Period by 31 March 2013.

1.1 Legislative Framework

The IMO is a body corporate that was established on 1 December 2004 to administer and operate the Wholesale Electricity Market (WEM) of Western Australia.

The key roles and functions of the IMO are set out in the following instruments:

- Wholesale Electricity Market Rules;
- *Electricity Industry (Wholesale Electricity Market) Regulations 2004; and*
- *Electricity Industry (Independent Market Operator) Regulations 2004.*

1.2 Wholesale Electricity Market Objectives

The *Electricity Industry Act 2004* sets out the objectives of the Wholesale Electricity Market:

- to promote the economically efficient, safe and reliable production and supply of electricity and electricity related services in the South West interconnected system;
- to encourage competition among generators and retailers in the South West interconnected system, including by facilitating efficient entry of new competitors;
- to avoid discrimination in the market against particular energy options and technologies, including sustainable energy options and technologies such as those that make use of renewable resources or that reduce overall greenhouse gas emissions;

- to minimise the long-term cost of electricity supplied to customers from the South West interconnected system; and
- to encourage the taking of measures to manage the amount of electricity used and when it is used.

1.3 Expansion of ERA Determination – To Include Forecast Capital Expenditure

The IMO previously submitted Allowable Revenue submissions to the ERA for the Review Periods 2007/08 to 2009/10, and 2010/11 to 2012/13.

Allowable Revenue is defined as the revenue that may be recovered through fees to meet the costs of providing IMO's services to the market.

As a result of RC_2011_02 the ERA determination requirements on the IMO's three yearly funding arrangements expanded to require an ERA determination of the IMO's Forecast Capital Expenditure.

The expansion of the ERA determination was proposed and approved to ensure that major projects that become operational in the later years of a three year Review Period, similar to the Market Evolution Program, would be captured and require ERA review and evaluation.

Forecast Capital Expenditure is defined as the predicted sum of capital expenditure required for a Review Period.

The Minister for Energy approved Rule Change_2011_02 on 3 July 2012 which expands the ERA's determination on the IMO's funding arrangements taking effect from the Review Period 1 July 2013 to 30 June 2016.

1.4 Allowable Revenue and Forecast Capital Expenditure Approval Mechanisms

After the Allowable Revenue and Forecast Capital Expenditure for the Review Period is determined by the ERA, the IMO is required to prepare budgets annually that are consistent with the ERA determination.

The annual budgets are submitted to the Minister for Energy for approval and provide the basis for the establishment of the annual Market Fees. The fee calculation takes account of the current projected generation and consumption of electricity.

If an IMO budget proposal is likely to result in revenue recovery (over the Review Period) of more than 15% of the ERA determination, the IMO is required to apply to the ERA for a reassessment of its Allowable Revenue. On the basis of the amounts included in this submission, the 15% threshold equates to $7.136 million.

Similarly, with effect from the Review Period 1 July 2013 to 30 June 2016, if an IMO budget proposal is

likely to result in capital expenditure (over the Review Period) being 10% greater than the capital expenditure approved by the ERA, the IMO is required to apply to the ERA to approve the adjusted Forecast Capital Expenditure. On the basis of the amounts included in this submission, the 10% threshold equates to $627,400.

These reassessment mechanisms exclude Declared Market Projects that involve major changes to the IMO's function or a major change to market systems. For the next Review Period, the threshold that would apply for a Declared Market Project is $5.505 million.

These changes should ensure that any MEP size projects cannot commence without ERA oversight and governance.

Any Declared Market Projects require ERA approval before commencement.

1.5 Basis for this Submission

The IMO makes this submission on the basis of business as usual. However, it is acknowledged that the business requirements of Market Participants and market stakeholders have a heavy influence on the IMO's workload and subsequent expenditure.

The Market Rules place an obligation on the IMO to progress and administer proposed Rule Changes submitted within a prescriptive set of timeframes and while there is a degree of flexibility with regard to implementation timeframes, under normal circumstances the IMO is not in a position to delay the implementation of a Rule Change until the next Allowable Revenue period.

Consequently, while the Allowable Revenue and Forecast Capital Expenditure submission makes allowance for the operating and capital expenditure to support business as usual activity, it is possible that during the Review Period Market Participants will request the IMO to undertake activity that was not budgeted in this submission.

Where this has occurred in the past, the IMO has separately identified and justified the activity as a special project and incorporated this into the IMO's annual Operational Plans for the Minister's consideration. Examples of where this has occurred are the Renewal Energy Working Group, the Market Evolution Program, and the Reserve Capacity Mechanism Working Group.

As a result of undertaking the Market Rules Evolution Plan (a copy of which is available as part of the detailed working papers which supports this submission), the Market Advisory Committee (MAC) members have placed a high priority on the implementation of a Spinning Reserve Market. If a Spinning Reserve Market were to be adopted it would most likely be highlighted as a special project.

Once the costs of any such projects can be determined they will be incorporated into the annual IMO budget approval process and the Market Fees.

2. Market Evolution Program

Implementation of the Market Evolution Program (MEP) commenced in 2010 following the 2009 Market Participant endorsed Market Rules Evolution Plan and the Government-commissioned Verve Energy Review.

Both initiatives highlighted areas for market improvement and identified issues around the lack of competition in aspects of the WEM.

The IMO business changed considerably with the introduction of the new Balancing Market on the 1st July 2012 and now involves a WEM system that is required to operate at high availability and is supported on a 24 hour a day basis by both IT and Market Operations personnel. This has placed a much greater demand on the WEM systems, processes and personnel to ensure the market is not affected.

The implementation of the MEP during this period allowed the IMO to make considerable improvement and enhancements to the WEM systems. MEP delivered:

- a new Registration system;
- a real time Balancing Market;
- a real time Load Following Ancillary Services Market (LFAS); and,
- a significant enhancement in market transparency.

Until 1 July 2012 only Verve Energy could provide Balancing and LFAS to the WEM, and the related administered Balancing and deviation prices (MCAP, UDAP and DDAP), were linked to the day-ahead STEM offers, which did not reflect real-time market conditions.

Since 1 July 2012 all Market Participants are competing to provide Balancing and have the opportunity of competing to provide LFAS.

The new Balancing and LFAS Markets push WEM market trading into the trading day for the first time.

The new markets have made a significant contribution to the economic efficiency of the WEM and include the following features:

- increasing IPP participation in balancing;
- ensuring consistency between the balancing price and dispatch;
- removing the Downwards Deviation Administration Price (DDP) and Upwards Deviation Administrative Price (UDAP);
- enabling IPPs to compete with Verve Energy to provide LFAS;
- removing the ‘generation level’ component of the Net STEM Shortfall calculation; and
- placing stronger emphasis on surveillance and compliance.

The new Balancing Market requires all available IPP generation facilities and the Verve portfolio to submit offers for each half hour trading period that enable the establishment of a Balancing Merit Order for dispatch, based on offer price. The new Balancing Market design is a considerable evolutionary step for the WEM and is more akin to a Gross Pool market construct.

The MEP allowed the IMO to improve the stability of its IT systems, and provided for enhanced data exchange between the IMO, Market Participants and System Management. In addition, MEP provided more real-time market data and enhanced transparency in terms of forecast prices, forecast dispatch quantities, load forecasts, outages, available capacity, plants commissioning and non-scheduled generation forecasts. The considerable enhancement in the transparency of this key market data will enable Market Participants to better manage their business and their risk exposure to the WEM and will ultimately drive towards a more efficient electricity market.

At the time of writing, the Balancing and LFAS Markets are operating in a transition period. On 5 December 2012 the offer gate closure will reduce from six to two hours, and IPP offer tranches will increase from four to ten. With price-based dispatch based on real-time market conditions, the MEP will have delivered cost-reflective market prices and encourage further competition in the WEM.

2.1 Cost Benefit Analysis

A cost benefit analysis (CBA) was undertaken by Sapere Research Group, at the commencement of the MEP program, designed to quantify the costs and benefits that would flow to the market from the proposed new Balancing Market. A copy of this document is available as part of the detailed working papers which supports this submission.

Although competitive balancing has only been operating for a short period and is currently operating under transitional arrangements, the IMO believed it would be worthwhile assessing if the benefits identified in the cost benefit analysis were starting to materialise.

Consultants Sapere Research Group was commissioned to review market outcomes, and if possible quantify the benefits to the market, based on the first four months of competitive Balancing Market operation.

The original cost benefit analysis indicated that changes in behavior as a result of the Balancing Market would result in between $7.8 million (low benefits scenario) and $9.6 million of benefits (high benefits scenario) for 2012/13.

The analysis provided by Sapere Research Group was only able (because of the limited data available – four months) to evaluate two of the four benefits highlighted in the original CBA. Sapere has estimated that the benefits already delivered in WEM are in the order of $5.1 million and have suggested that the benefits that would accrue from the two benefits able to be accessed will be approximately $15.3 million in the first full year of operation.

These benefits are limited to those areas which have proven to be measurable after four months, which for the moment exclude benefits related to lower cost balancing capacity, and early return from outages.

A copy of the analysis conducted by Sapere Research Group is at Appendix 1.

2.2 MEP Financial Impacts

The original MEP plan and budget identified IMO project implementation costs of $8.9 million and a delivery date of April 2012, which was set in consultation with System Management.

The MEP budget and funding arrangements were approved by the then WA State Treasurer (the Honorable Colin Barnett) on 15 December 2010.

The IMO's project readiness was concluded by the due date; however, System Management identified various transitional arrangements needed to be put in place from April 2012 to December 2012 to allow for changes to its systems to be concluded.

The support of these transitional arrangements (not previously allowed for in the MEP plan and budget) adversely impacted the project budget and as a consequence, additional funding of $750,000 was required when the transitional arrangements were approved.

A further delay to the implementation timetable was approved in February 2012 to again allow System Management to conclude urgent system changes. The cost impact on the IMO project was an additional $750,000 which was required in 2012/13 to support a small MEP project team to assist System Management in the rollout of its systems and infrastructure and to ensure the IMO WEM systems underwent integration testing when System Management's systems were available. The IMO also maintained regular stakeholder engagements with Market Participants to ensure the preparedness for the full implementation in December 2012.

The overall financial impact of the two delayed implementations resulted in the total project cost being $9.8 million to 30 June 2012, with additional funding of $750,000 required to support the transitional market arrangements for the period 1 July 2012 to 30 November 2012.

The $9.8 million expended to 30 June 2012 was capitalised on 1 July 2012. In line with the IMO's corporate accounting arrangements, this is to be depreciated over an effective useful life of five years.

The combination of the depreciation expense, together with associated borrowing costs, adds additional expenditure related to the MEP across the next Review Period of $2.4 million in 2013/14, $2.2 million in 2014/15 and $2.1 million in 2015/16.

As outlined in Section 2.1, the indication (after four months operation of the new Balancing Market) is that the annual benefit to the market will be in the order of $15.3 million.

In terms of Market Fee rate impact, additional annual expenditure in the order of $2.2 million related to the MEP translates into an increase in the annual fee rate of approximately 0.060 $/MWh.

3. Recurrent Budget by Service

Rule 2.22.3 of the Market Rules requires the IMO to seek approval of its Allowable Revenue for each of the services it provides.

The proposed Allowable Revenue associated with each of these services is:

	2013/14 ($'000)	2014/15 ($'000)	2015/16 ($'000)
Market Operations	8,008	8,217	8,186
System Planning	2,721	2,912	3,050
Market Administration	5,096	5,136	5,450
ALLOWABLE REVENUE	**15,825**	**16,265**	**16,686**

4. Recurrent Budget Comparisons

4.1 Comparison: 2010/11 – 2012/13 (Actual/Budget) to 2013/14 – 2015/16 Submission

	2010/11 – 2012/13 Actual/Budget	2013/14 – 2015/16 Submission	Increase/ (Decrease)	
Description	Total ($'000)	Total ($'000)	($'000)	%
Employees Benefit Expense	$15,137	$17,521	$2,384	16%
Accommodation Costs	$897	$2,251	$1,354	151%
Supplies and Services	$15,075	$15,000	($75)	(0.5%)
Borrowing Costs	$1,302	$1,277	($25)	(1.9%)
Depreciation	$8,993	$12,877	$3,884	43%
Total Expenditure	$41,404	$48,926	$7,522	18%
Less Interest Income	-$498	-$150	348	70%
Net Expenditure (Allowable Revenue)	**$40,906**	**$48,776**	**$7,870**	**19%**

[Further detail in respect of the comparison is provided at Appendix 2.]

A simple comparison of the IMO financial performance between the current Review Period and the submission for the next Review Period reflects an increase in net expenditure of $7.870 million (or 19%).

There are a number of abnormal increases and one off factors which need to be taken into account, however, to arrive at a valid comparison between the two Review Periods.

As outlined in Section 2.2, capital expenditure of $9.8 million to 30 June 2012, together with $750,000 in 2012/13, result in combined capital expenditure of $10.55 million in the current Review Period on the Market Evolution Program. This results in depreciation and borrowing costs in the next Review Period of $6.7 million - this compares to depreciation and borrowing costs included in the above table for the current Review Period of $4.1 million – an increase between the Review Periods of $2.6 million.

The IMO has incurred a significant increase in accommodation costs of $1.354 million or 151%. This increase is influenced by a number of abnormal and one off issues related to the leasing of the IMO offices (described in detail in Section 5.6).

Employee Benefits Expenses increase between the two Review Periods by $2.384 million (or 16%). There are an additional five positions included in this submission for the IMO from 2013/14 onwards, corresponding to 4.1 FTE for the IMO's electricity related responsibilities (the balance of 0.9 FTE is allocated to the IMO's new gas related responsibilities, in accordance with a comprehensive costing methodology which allocates overheads between gas and electricity). The increase of the 4.1 FTE related to electricity related responsibilities in the next Review Period equates to $1.289 million across the next Review Period. This is explained in detail at Section 5.4.1.

A once off abnormal item of $543,480 has been included in 2013/14 for the recovery of GST (and interest) that was incorrectly raised by the IMO on the ERA's component of the Market Participant Fee. This is explained in detail in Section 5.5.1.

The impact of the introduction of the Balancing and LFAS Markets from 1 July 2012 results in additional costs necessary to support a 24/7 delivery model, budgeted to cost an additional $295,000 in the next Review Period. Section 5.5 has further details.

The budget for the next Review Period includes full market audits for the IMO in 2014/15 and for System Management in 2015/16, adding an extra $660,000 in the next Review Period. This is explained further in Section 5.5.

The financial impact of adjusting for the above issues is set out below:

	2010/11 – 2012/13 Actual/Budget	2013/14 – 2015/16 Submission	Increase/ (Decrease)	
Description	Total ($'000)	Total ($'000)	($'000)	%
Net Expenditure	$40,906	$48,776	$7,870	19%
Less Abnormal Items:				
• MEP (Depreciation & Borrowing Costs)	($4,129)	($6,721)	($2,592)	
• Accommodation	($897)	($2,251)	($1,354)	
• Extra 4.1 FTE from 2013/14	-	($1,289)	($1,289)	
• ERA GST recovery	-	($543)	($543)	
• 24/7 support model	($135)	($430)	($295)	
• Full market audits	-	($660)	($660)	
Net Expenditure - Adjusted For Abnormal Items Between The Two Periods	$35,745	$36,882	$1,137	3.2%

After adjusting for the impact of abnormal increases and one off items the increase in expenditure between the two Review Periods would be 3.2%.

This underlying 3.2% increase should be compared with the 2012/13 Western Australian State Budget Overview Paper which contains CPI estimates through to 2015/2016 – this produces an effective indexation factor between the two Review Periods of 9.6%.

4.2 Market Fee Rate

4.2.1 Market Fee Rate – Movement 2012/13 to 2015/16

The IMO is required to calculate Market Fees each year based on its approved Operational Plan.

In accordance with Market Rule 2.22.7, where actual Market Fees are greater than (or less than) the IMO expenditure in any one year, then the surplus (or shortfall) needs to be applied as an adjustment to the Allowable Revenue budget two years hence.

This surplus or shortfall can arise as a result of either an over recovery of Market Fees due to a higher volume of energy traded in the market or as a result of a cost variation from the budget in the Operational Plan.

These adjustments are identified when the Operational Plan (inclusive of budget arrangements) is submitted to the Minister for Energy for approval each year. Once approved by the Minister, the approved Market Fee rate is published on the IMO website.

The terms Unadjusted Market Fee Rate and Adjusted Market Fee Rate were used in the IMO's 2010/11 – 2012/13 Allowable Revenue Submission. The Adjusted Market Fee Rate equates to the rate that is ultimately approved by the IMO Board and published on the IMO website.

The Unadjusted Market Fee Rate was used in order to remove inter-period budget adjustments and abnormal revenue items (both of which have distorting impacts from one year to the next) so as to present the effective underlying movement in the Market Fee Rate.

Both sets of information are set out below, showing the movement from 2012/13 to 2015/16.

		New Triennium		
	2012/13	2013/14	2014/15	2015/16
UNADJUSTED MARKET FEE RATE				
Unadjusted Allowable Revenue [1] ($'000)	$16,225	$15,875	$16,315	$16,736
Unadjusted Market Fee Rate ($/MWh)	0.458	0.432	0.435	0.437
ADJUSTED MARKET FEE RATE				
Unadjusted Allowable Revenue [1] ($'000)	$16,225	$15,875	$16,315	$16,736
Adjusted for:				
• Inter Period Budget Adjustment (from 2010/11) ($'000)	-$500	-	-	-
• Abnormal Interest [3] ($'000)	-$120	-	-	-
• Normal Interest ($'000)	-$50	-$50	-$50	-$50
Adjusted Allowable Revenue ($'000)	15,555	$15,825	$16,265	$16,686
Adjusted Market Fee Rate ($/MWh)	0.439 [2]	0.430	0.434	0.436

1. Unadjusted Allowable Revenue is the total budgeted expenditure. It is the amount that would normally be recovered from Market Participants through Market Fees. It ignores interest revenue, and inter-period budget adjustments required under Market Rule 2.22.7.
2. Published Market Fee Rate for 2012/13.
3. Abnormal interest relates to $1.422M held on deposit in relation to market default by WA Biomass.

4.2.2 Market Fee Rate Movement 2012/13 to 2015/16 - Adjusted For Indexation

The Western Australian State Budget 2012/13 Overview Paper provides annual CPI figures for Perth through to 2015/16.

Applying these figures to the Market Fee Rate information enables a valid comparative assessment across the four years as set out below:

		New Triennium		
	2012/13	2013/14	2014/15	2015/16
UNADJUSTED MARKET FEE RATE	0.458	0.432	0.435	0.437
Annual CPI Forecast Figures	Base	3.25%	3.25%	3.25%
UNADJUSTED MARKET FEE RATE – CUMULATIVE INDEXATION APPLIED	**0.458**	**0.418**	**0.408**	**0.397**
ADJUSTED MARKET FEE RATE	0.439	0.430	0.434	0.436
Annual CPI Forecast Figures	Base	3.25%	3.25%	3.25%
ADJUSTED MARKET FEE RATE – CUMULATIVE INDEXATION APPLIED	**0.439**	**0.416**	**0.407**	**0.396**

5. Recurrent Budget 2013/14 – 2015/16

5.1 Budget Categories

Budgeted expenditure in this submission has been broken into the cost categories required by the Auditor General for the IMO's Financial Statements.

These cost categories are:

- *Employee Benefits Expense* – salaries, superannuation, payroll tax and fringe benefits tax.
- *Supplies and Services* – includes IT expenditure, accounting, auditing, human resources, administrative costs, insurance, travel and training. In addition, consultant expenditure in support of service delivery.
- *Accommodation* – office rental, cleaning, electricity, maintenance and car parking.
- *Depreciation* – depreciation of fixed assets.
- *Borrowing* – interest expense.

5.2 Cost Comparisons

The budgeted expenditure for the Review Period is set out in the categories below:

	2012/13 ($'000)	2013/14 ($'000)	2014/15 ($'000)	2015/16 ($'000)	Total ($'000)
Employee Benefits Expense	5,394	$5,568	$5,851	$6,102	$17,521
Accommodation	204	$715	$753	$783	$2,251
Supplies and Services	4,470	$5,064	$4,952	$4,984	$15,000
Borrowing Costs	592	$582	$391	$304	$1,277
Depreciation	5,565	$3,946	$4,368	$4,563	$12,877
Total Expenditure	16,225	$15,875	$16,315	$16,736	$48,926
Interest Revenue	(170)	(50)	(50)	(50)	(150)
ALLOWABLE REVENUE	**16,055**	**15,825**	**16,265**	**16,686**	**48,776**

5.3 Annual Indexation

This submission incorporates annual indexation costs, which has been based on Department of Treasury advice of 1.75% across the Review Period.

Excluded from this indexation are costs that are covered by fixed priced contracts, where the IMO has received specific advice for a cost category on market price movement (e.g. annual remuneration increases) and borrowing costs.

5.4 Employee Benefits

5.4.1 Approved positions

The IMO currently has 39 approved positions, corresponding to 38.5 FTE's after adjusting for part-time positions.

Five temporary positions (corresponding to 4.5 FTE) were approved for 2012/13 for the Gas Implementation Services Project (GISP), with three of these positions planned to transition into permanent positions from 2013/14.

It is important to note that there are no dedicated "gas" positions proposed for 2013/14 onwards – as GIS will be integrated into the IMO's existing operations and will be delivered by IMO staff that has both electricity and gas responsibilities. This has the advantage of strengthening the operational capability of the IMO and our delivery for both the WEM and GIS. This structure should also reduce the risk of the IMO facing key man dependency going forward.

The IMO has determined that an additional two positions (2 FTE's) are required to meet business needs in the Review Period. These are:

- Junior Lawyer. The IMO has taken on increased market compliance monitoring activities (as a result of MEP changes), additional rule drafting and commercial legal responsibilities. These activities are compounded by the addition of GIS matters. This additional resource will address these needs as well as reduce the key person dependency that currently exists. A portion (17%) of the Junior Lawyer and the Manager of Legal and Compliance costs will be shared with GIS.
- Additional Graduate. The IMO has strategically acknowledged that it is difficult to recruit suitably qualified and experienced analysts and market operators in Western Australia. The IMO graduate program has now been operational for 3 years and currently takes on one graduate each year. All 3 graduates to date have secured permanent roles at the IMO and are all still employed within the organisation. With staff turnover averaging 2 -3 staff each year, it would be beneficial and cost-effective to take on an additional graduate enabling a suitably trained resource to be appointed when a staff member resigns.

A detailed schedule showing the FTE split of all IMO staff between electricity and gas, together with a full reconciliation of all current approved positions to the positions approved in the previous ERA Determination is available as part of the detailed working papers which supports this submission.

The detailed FTE split between gas and electricity is informed by a comprehensive costing methodology which allocates overheads between gas and electricity. This is also available as part of the detailed working papers.

The combined effect of the three positions transitions from the GISP implementation and the two new positions result in the IMO having 44 positions from 2013/14, corresponding to 43 FTE after adjusting for part-time positions.

Although the total IMO FTE increases by five in 2013/14, the effect of the overhead costing methodology results in only 4.1 FTE of the five positions being allocated to electricity responsibilities.

Importantly, whilst the total IMO FTE increases in 2013/14, the FTE share relating to the IMO's electricity responsibilities actually reduces. This is due to the influence of the overhead costing methodology allocating a share of corporate overhead to the IMO's gas responsibilities – the IMO's electricity related FTE reduces from 38 FTE in 2012/13 to 37.5 FTE in 2013/14.

5.4.2 Market salary levels

Employee Benefit Expenses is the IMO's biggest expenditure category, accounting for 36% of total budgeted expenditure across the Review Period.

The quality of the IMO service delivery is heavily dependent on the quality of staff and the retention of institutional knowledge.

The IMO operates in the competitive Western Australian job market which presents challenges for both recruiting and retaining quality staff. This is particularly true of the buoyant Western Australian energy sector.

In September 2012, the IMO engaged an independent remuneration consultant, Mercers, to conduct a detailed remuneration review on 18 selected positions, with a focus on those positions that have a specialised aspect to them e.g. Market Operators.

This review was commissioned to ensure that staff costs reflect an appropriate market level. The review included a comprehensive assessment of the responsibilities, accountabilities and core competencies for each approved IMO position.

The remuneration review recommended a base salary range for each position. This recommendation was based on remuneration comparisons with:

- organisations of similar size;
- organisations from a similar industry sector; and
- comparative organisations that compete with the IMO for staff in the same job market (e.g. electricity Market Operators and Western Australian electricity Market Participants).

The IMO Board agreed that the recommended market ranges contained in the initial report were on average higher than what was appropriate and reasonable, given the history of average salary increases awarded over the past three years.

The IMO Board endorsed Mercers to target an average of 40-45% of the recommended levels contained in their initial report which produced a revised set of recommended ranges providing for an average increase of 5.5% for the surveyed positions.

Mercers also recommended a general 4% increase for the positions which were not specifically reviewed, and recommended 4% annual increases for all positions over the next three years.

The budgeted salary increases included in this submission are based on this advice from Mercers.

The IMO reviews staff performance and recommends salary increases commensurate with performance with effect from 1 April of each year.

5.5 Supplies and Services

The IMO is a small, professionally-staffed organisation which is strongly reliant on the outsourcing of specialist services to ensure highest quality input at an efficient cost.

	2012/13 ($'000)	2013/14 ($'000)	2014/15 ($'000)	2015/16 ($'000)
IT Support	2,146	2,181	2,261	2,269
Corporate Support	957	1,108	1,132	1,196
Legal & Compliance	288	295	778	481
Market Operations	59	85	86	88
Market Administration	759	597	387	573
System Planning	260	255	308	377
ERA GST Recovery	-	543	-	-
Total	**4,470**	**5,064**	**4,952**	**4,984**

IT Support incorporates the following costs:

- Wholesale Electricity Market System (WEMS) and Settlements maintenance and support;
- datacentre hosting by specialist service providers;
- high speed fibre links between head office, production and backup datacentres;
- specialist database support;
- IT desktop and infrastructure support; and
- telecommunications and internet access costs.

The IMO's single biggest contracted expenditure is under IT Support and relates to the WEMS Maintenance and Development Support ($784,000 p.a.). The IMO is currently concluding tender arrangements for this item for the next three years. While final negotiation on cost needs to be completed, it is expected that no significant shift in prices will occur.

The cost impact of moving to a 24/7 support model from 1 July 2012 has been in four key areas:

- Wholesale Electricity Market System (WEMS) contract needed to be increased by approximately $30,000 annually which includes a base support access and Time & Materials costs associated with resolving after hours issues;
- infrastructure support costs have increased $15,300 annually;
- external database support costs have increased an estimated $30,000 annually to ensure coverage when staff are on annual leave; and
- need to budget for on-call and after hours support allowances of approximately $60,000 annually.

Corporate Support costs are impacted by increases in the IMO's human resource related expenditure categories. These include an increase in the staff training budget based on the advice received from the Australian Institute of Management, and providing appropriate temporary staffing support for service delivery areas.

Legal and Compliance costs are heavily influenced by a proposed one off full operational compliance audit planned for the IMO in 2014/15 ($600,000) and System Management in 2015/16 ($300,000). This full audit would be the first end to end audit undertaken in WEMs since market inception. Annual market audits have been conducted on an incremental basis over the last five years. The IMO Board approved the inclusion of this comprehensive audit to provide additional security for Market Participants that the WEM is being conducted in accordance with the Market Rules and Procedures. The full operational audit was recommended by PA Consulting in their 2012 Market Audit Report.

Market Administration costs include:

- the external costs of supporting Rule Changes determined by the Market Advisory Committee;
- cyclical reviews required under the Market Rules (e.g. outage planning review, margin peak and off-peak review, etc.); and
- Reserve Capacity Mechanism (RCM) Working Group activity. The IMO Board approved a review into the RCM in 2011 which resulted in the establishment of a working group to consider the matter.

System Planning costs are budgeted to fluctuate over the Review Period in line with planned cyclical reviews required by the Market Rules. These include:

- a review of the Maximum Reserve Capacity Price (MRCP) methodology; and
- a review of the weighted average cost of capital calculation of the MRCP.

Notably, budgeted expenditure on supplies and services declines in nominal terms across the two Review Periods, reducing from $5.369 million in 2010/11 to $4.984 million in 2015/16 (see Appendix 2).

5.5.1 Recovery of GST incorrectly passed to the ERA

From market start, the IMO has been collecting Regulator Fees from Market Participants on behalf of the ERA and passing these fees onto the ERA monthly.

The Regulator Fees compensate the ERA for the costs of providing the services it is required to perform in undertaking its functions under the WEM rules.

From market start to June 2012, all Regulator Fees which were passed onto the ERA had GST added to them, and the IMO issued the ERA with Recipient Created Tax Invoices which itemised the GST. On this basis the IMO claimed input tax credits.

As a result of a disagreement between the IMO and the ERA as to the GST classification of the Regulator Fee, both parties sought independent private rulings from the Australian Taxation Office (ATO).

In September 2012 the ATO released its private ruling on the IMO's private ruling submission, advising that the Regulator Fee passed onto the ERA should have been exempt from GST from market start. As

a result of the ATO's ruling, the IMO has over claimed input tax credits in respect of its payment of the Regulator Fee to the ERA.

The practical effect of the GST paid by the IMO to the ERA, was that the ERA received an additional 10% more than should have been passed on. Any additional amounts received by the ERA would have been recycled as a reduction to future year budgets and regulator fees – as required under Market Rule 2.24.5A.

The impact of this arrangement on Market Participants was twofold:

- participants would have claimed an input tax credit for the GST paid to the IMO for the Regulator Fee; and
- participants would have been charged 10% less through the reduction to the ERA's future year Regulator Fee budgets.

The impact of the ATO's private ruling is that the IMO has over claimed input tax credits which are required to be repaid to the ATO. The amount concerned is $499,551.

The IMO took legal advice on the matter which included advice that:

- the IMO is required to repay the GST recovery amount as a matter of law; and
- the IMO can include the recovery amount in the Allowable Revenue and Forecast Capital Expenditure submission for the next Review Period.

A copy of this advice is available as part of the detailed working papers which supports this submission.

The IMO is currently engaged with the ATO on this matter and is progressing a course of action designed to address the issues which emerge from the ATO's private ruling, with a view to minimizing the impact on Market Participants.

The ATO has agreed to repayment arrangements for the GST recovery amount over the course of the first year of the Review Period. The amount due of $499,551 was registered in the ATO recovery system on Friday 23rd November 2012, from which point interest applies on the reducing balance until the debt is fully repaid. This results in interest that also needs to be repaid over the course of 2013/14 of $43,929 bringing the total to be repaid to $543,480.

5.6 Accommodation

The IMO shifted into refurbished office premises on 3rd September 2012, located on Level 17 of Governor Stirling Tower. The IMO was previously located on Level 3 of Governor Stirling Tower.

The requirement for the shift was due to the Government's lease on Governor Stirling Tower concluding on 30 June 2012, with all agencies having to secure alternative premises from that time. This coincided with new ownership of the building taking effect from that date.

The IMO conducted an exhaustive search in a highly competitive Perth property market over a protracted period in an effort to source suitable accommodation. This search over nine months included issuing two expressions-of-interest to the market, multiple site inspections over nine different premises, issuance and receipt of repeated proposals and counter-proposals, and two options identified as being preferred becoming unavailable at the last minute (after extensive negotiation on terms).

The IMO ultimately secured a lease on Level 17 of Governor Stirling Tower, which provided for an area of 860m^2, compared to an area of 477m^2 under the previous lease. The leasing arrangements provided for the premises to be refurbished April – June 2012.

The increase in space requirement was necessary to properly accommodate the IMO staffing requirements and enable a more client friendly design layout e.g. conference room capable of hosting Market Participant events and training activities.

The rental rate for the new lease of $660m^2, represented a significant increase on the previous rental rate of $396m^2 (an increase of 67%). This was due to the previous lease reflecting rental rates which were "locked in" when the lease for Governor Stirling Tower was negotiated by the Government in 2002. The IMO benefited from a rental rate when it moved into Level 3 of Governor Stirling Tower in April 2008 ($315m^2) that was substantially discounted to the prevailing market rate – this benefit carried through to when the IMO took out the new lease on Level 17 of Governor Stirling Tower.

The combination of the increase in space and increase in rental rate with effect from the new lease commencement date of 1 July 2012 sees a sizable increase in the IMO's accommodation costs.

This would normally have seen accommodation rental expenditure in 2011/12 of $189,048, increasing to $567,402 in 2012/13 – an increase of $378,354 (or 201%).

Two abnormal factors combine, however, to reduce the accommodation rental budget for 2012/13:

1. The new lease provided for an incentive of $851,000 to be used as a contribution towards the fitout and/or to be taken as rent free. The IMO decided to apportion this incentive between its office fit out and a rent holiday. The IMO took $472,835 of the incentive as rent free in 2012/13, with the residual being used to subsidize the Office Fit-out.
2. Delays related to the vacating of the premises by the previous tenant (Department of Premier and Cabinet) meant that the refurbishment could not commence until July 2012, and the IMO could not occupy the new premises until 3rd September 2012. In this event, the new lease allowed the IMO to continue paying the previous (lower) monthly rental amount for the period July to August 2012.

This arrangement is set out below:

Office Rental *	2011/12 ($'000)	2012/13 ($'000)	2013/14 ($'000)
Base Rent – Per Leases	189	567	590
Less:			
- Incentive taken as "rent free"	-	-473	-
- July and Aug 2012 at reduced rate	-	-63	-
Total	**189**	**31**	**590**

* Excludes outgoings, parking, and sundry other expenses

The new lease provides for 4% annual rental increases from 2012/13. The new lease agreement was negotiated with the support of accommodation leasing consultants VSA Property Group, who provided advice on the commercial terms and conditions of the new lease.

5.7 Depreciation

Depreciation accounts for 26% of total budgeted expenditure across the Review Period.

Depreciation is determined by the expected written down value of assets as at 30 June 2013, together with depreciation that flows from assets purchased over the Review Period.

Section 6 deals with the IMO's Forecast Capital Expenditure over the Review Period, which is predicated on the IMO's "IT Roadmap" for the period 2013 -2016.

At Appendix 3 is a copy of the IT Roadmap which encompasses the budgeted depreciation arrangements for the Review Period.

5.8 Borrowing Costs

All capital requirements over the Review Period are funded by way of loan funding provided by the Western Australian Treasury Corporation (WATC).

Projected borrowing costs across the Review Period have been calculated on existing funding facilities and projected capital expenditure and are based on funding rates provided by the WATC.

6. Forecast Capital Expenditure 2013/14 – 2015/16

As outlined in Section 1.3, the ERA determination requirements on the IMO's funding arrangements were recently expanded to also require ERA determination of the IMO's Forecast Capital Expenditure.

Forecast Capital Expenditure is defined as the predicted sum of capital expenditure required for a Review Period.

From July to November 2012, the IMO developed its key strategic IT planning document, culminating in the production of an IT Roadmap for the period 2013 – 2016.

The IT Roadmap is the primary strategic planning tool used to ensure that the planning, delivery, management and use of the IMO's IT systems optimally support the IMO's business.

This document was submitted to the Minister for Energy for endorsement on 26 October 2012, for consideration as part of the State Capital budget for 2013/14 onwards.

This IT Roadmap represents the third time the IMO has developed a technology roadmap and has been developed to support the IMO's Allowable Revenue and Forecast Capital Expenditure submission for the Review Period. The first two IT Roadmaps achieved significant improvements to the performance of the IMO's core IT systems.

The first Roadmap covered the period 1 July 2008 to 30 June 2010 with a key focus on the separation of the IMO Systems from the Department of Treasury and Finance.

The second Roadmap extends from 1 July 2010 to 30 June 2013 and has included a large body of work to bring core systems (such as settlements and metering) up to date with current release versions so they can be supported more effectively by the IMO's strategic vendors.

The IMO business changed considerably with the introduction of the new Balancing Market on the 1st July 2012 and is now a system that is required to be supported on a 24 hour a day basis. This has placed a much greater demand on the WEM systems, processes and personal to ensure the market is not affected by IT system failures.

The implementation of the MEP during this period allowed the IMO to make considerable improvement and enhancements to the WEM systems, and achieved the strategic objective of extending the life of the WEM systems to the next milestone change in the WEM design or to at least 2016/17 when the core system will be 10 years old.

The third version of the IT Roadmap reflects declining capital investment in the IMO's core market systems over the Review Period, in keeping with the strategic intention to replace these systems in 2016/17.

In summary, the IMO's third IT Roadmap will:

- Continue to maintain systems to ensure they remain current and supported by our vendors;
- Extend applications to support Market Participants that have a varying degree of technical sophistication;
- Maintain the strategic objective of enhancing market transparency; and
- Develop and implement integrated compliance and monitoring tools in the WEM Systems.

This submission seeks Forecast Capital Expenditure across the next Review Period as set out below:

	2013/14	2014/15	2015/16
Forecast Capital Expenditure ($'000)	2,583	1,984	1,707

At Appendix 3 is a copy of the IT Roadmap, which sets out in detail the Forecast Capital Expenditure requirements across the Review Period.

Appendix 1

Report prepared for Independent Market Operator

Benefits of balancing – first 4 months

Kieran Murray

26 November 2012

sapere research group

About the Author

Kieran Murray provides expert evidence, testimony and reports in the fields of public-policy, competition analysis and regulation, including market design. He has served as an economic consultant on these matters for public agencies and private companies in Australia, Canada, New Zealand, Philippines, Tonga, Singapore, Vietnam and the United States. He is a lay member of the NZ High Court and serves as an International Arbitrator for the PNG Independent Consumer and Competition Commission.

About Sapere Research Group Ltd

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.

For information on this report please contact:

Name: Kieran Murray

Telephone: +64 4 915 7590

Mobile: +64 212451061

Email: kmurray@srgexpert.com

Contents

Figures

sapere research group

Executive summary

In April 2011, I prepared an assessment of the expected benefits and costs of allowing market participants in the WEM to compete to provide balancing services. That cost-benefit analysis (CBA) quantified a small number of direct benefits, and identified other expected benefits not amenable to quantification in the timeframe available for the study.

The analysis indicated that changes in behaviour as a result of a balancing market would result in quantifiable benefits of between $7.8m (low scenario) and $9.6m (high scenario) in the first full year of the balancing market. The study expected these benefits to result from:

- lower cost balancing capacity
- increase in bidding capacity of IPPs
- early return of plant from outages
- reduction in cycling costs of baseload plant

This report views data from the first four months of trading under the (transitional) balancing market to assess whether these expected (and quantifiable) benefits have begun to materialise. In assessing the extent to which the predicted benefits have been realised two timing issues are relevant:

- Only four months of actual data is available, and hence any observable results needs to be extrapolated to provide a comparable first full year estimate.
- Some benefits were predicted to arise following particular events (e.g. sustained price disruption) and as those events did not occur during the four month period, it is too early to assess whether the balancing market will deliver the predicted benefit - this does not mean that the benefits will not materialise; only that the distribution of events is such that it would not be correct to include benefits in a point-in-time manner.

Despite these difficulties, available data shows benefits are arising consistent with the manner expected. Moreover, the magnitude of those benefits able to be reliably calculated supports the conservative description in my earlier analysis – that is, actual benefits appear to be greater than the 'high' scenario used for the CBA.

Table 1 below summarises the benefits predicted in my cost benefit analysis with the actual results to date.

Table 1 Summary of benefits

Benefit category	CBA expected benefit (high benefits scenario)	Estimated 4 months	Estimated 12 months
Lower cost balancing capacity	$3.2m	*Not yet observable*	
Increase in bidding capacity of IPPs	$3.6m	$4.3m	$12.9m
Early return from outages	$1.0m	*Not yet observable*	
Reduction in cycling	$1.8m	$0.8m	$2.4m
Total	**$9.6m**	***$5.1m***	***$15.3m***

In the four months of operation, measured benefits are around 53 per cent to 65 per cent of annual estimated benefits, depending on whether measured against the 'high scenario' or the 'low scenario'. A linear approximation of the realised benefits suggests that annual actual first year benefits may be about twice that expected, when assessed against the 'high' benefit scenario estimate. This is despite the data being inconclusive in respect of the two major contributors to the expected quantifiable benefits.[1]

This is clearly a strong positive result, given that competitive balancing has only been in operation for four months.

The analysis in this report considers only those benefits that we expected to observe in the first instance, and which were quantifiable over the timeframe of the initial study. The April 2011 CBA also pointed to additional important benefits which were less amenable to quantification and/or do not result in purely economic outcomes (e.g., financial transfers that reduce costs for consumers).

The evidence to date is that IPPs are responding to the incentives and opportunities provided by the balancing market in a manner that is enhancing economic efficiency and will over time deliver significant benefits to WA.

[1] Note that there may be difficulties in separating out the first two categories so it is possible that the benefits I observed from an increase in bidding capacity are better categorised as use of lower cost balancing capacity.

sapere research group

Introduction

In April 2011, I prepared an assessment of the expected benefits and costs of allowing market participants in the WEM to compete to provide balancing services.[2] That cost-benefit analysis (CBA) quantified a small number of direct benefits, and identified other expected benefits not amenable to quantification in the timeframe available for the study.

The four directly measurable benefits of a balancing market quantified in my April 2011 CBA were:

- lower cost balancing capacity
- increase in bidding capacity of IPPs
- early return of plant from outages
- reduction in cycling costs

The new balancing market commenced operation on 1 July 2012, under a transition arrangement; the remaining features of the new market will take effect from 5 December 2012. This report views data from the first four months of trading under the (transitional) balancing market to assess whether these expected (and quantifiable) benefits have begun to materialise.

Lower cost balancing capacity

Following the sequence of the April 2011 CBA report, the first benefit I consider is the potential for cost savings from having lower cost IPP plant dispatched before Verve plant in the merit order. In the April 2011 CBA, we reviewed market data to identify circumstances where existing STEM offers indicated that an IPP would have been dispatched in place of Verve, but was not. We assessed the difference between the IPP offer and the Verve offer as a potential cost saving following the introduction of competitive balancing. We expected that this benefit would lead to use of more efficient plant. One outcome of this benefit is that over time we might expect to observe an increase in CCGT generation and for higher cost OCGT generation to be used only where necessary.

It is not yet possible to reach a conclusion on this benefit.

There is some evidence that, despite the increase in intermittent generation, the balancing market has facilitated the more effective use of baseload generation. However, the short time series for the balancing market does not allow a definitive conclusion on this point. On the other hand, there is nothing to suggest that the balancing market has led to an inefficient use of generation resources when looking at the generation mix.

Some of this benefit category may well have been captured in the next section; it is a difficult exercise to split these categories of benefit, but such a split will be possible with data over a longer time period.

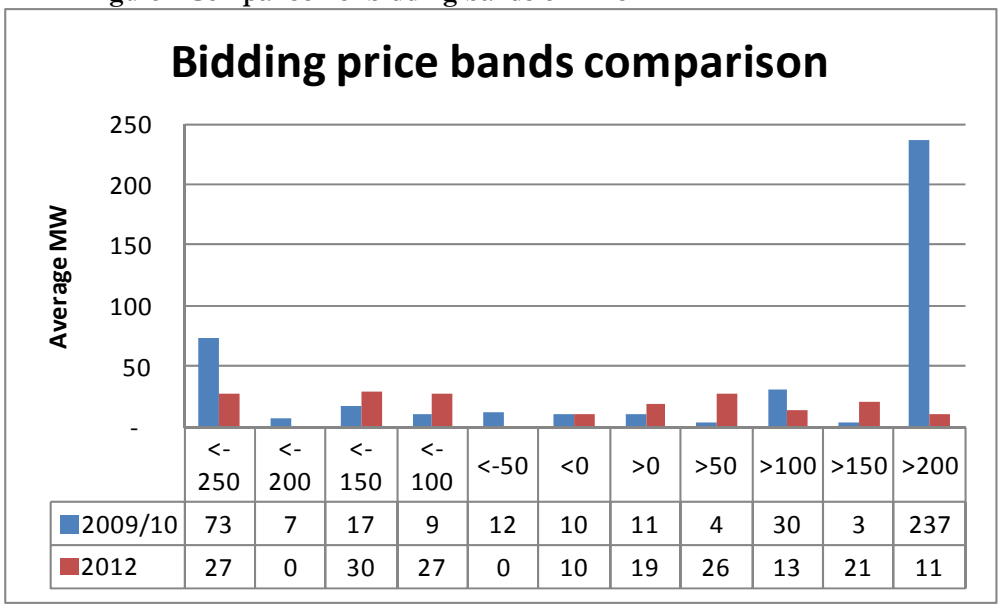
[2] Kieran Murray, *Introducing Competition to Balancing Services: A high level cost-benefit analysis*, April 2011

Increase in bidding capacity of IPPs

The second benefit quantified in the April 2011 CBA was the increased availability of IPP generation. We assessed that with a shorter gate closure, and the ability of IPPs to respond to events, more capacity would be bid into the balancing market. The benefit of additional capacity being bid into the market is that plant used for balancing would be least cost, which would benefit consumers in the form of lower balancing costs.

The following table illustrates that there has been increased participation of IPPs since the launch of the balancing market.

Figure 1 Comparison of bidding bands of IPPs

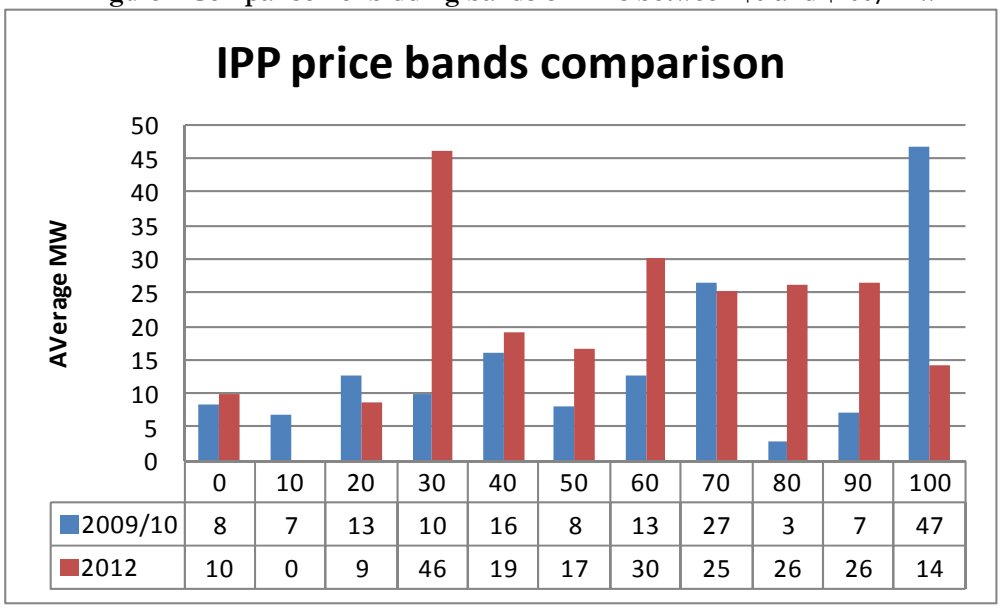


	<-250	<-200	<-150	<-100	<-50	<0	>0	>50	>100	>150	>200
2009/10	73	7	17	9	12	10	11	4	30	3	237
2012	27	0	30	27	0	10	19	26	13	21	11

This table illustrates that prior to the introduction of the balancing market much of the available IPP capacity was offered in at extreme prices to ensure either dispatch with certainty or non dispatch with certainty. Following the introduction of the balancing market it appears that there has been an increase in IPP generation made available in the price bands between $0/MW and $100/MW.

The following table illustrates the increased bidding in more detail for the crucial price bands:

Figure 2 Comparison of bidding bands of IPPs between $0 and $100/MW

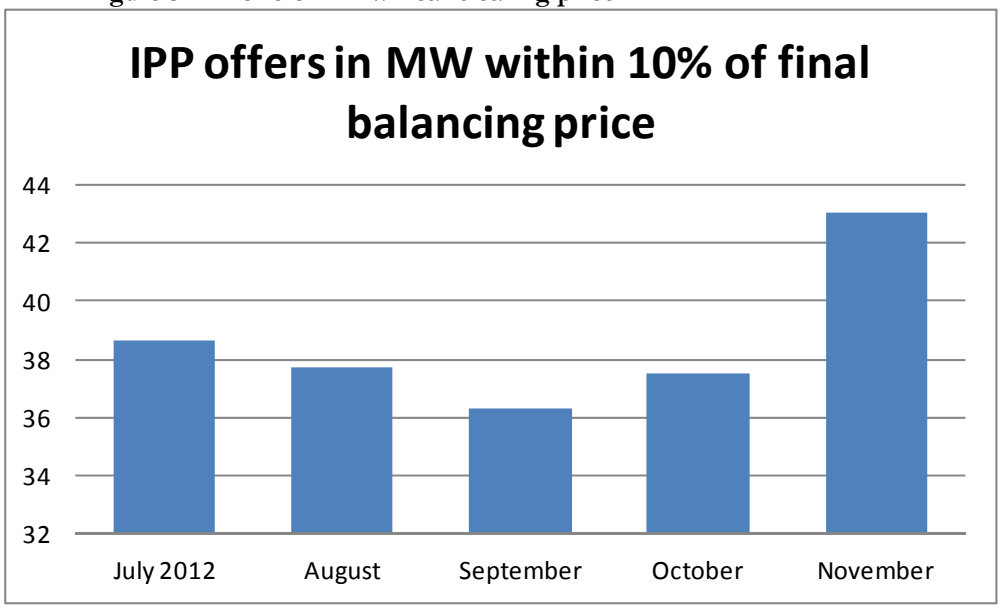


	0	10	20	30	40	50	60	70	80	90	100
2009/10	8	7	13	10	16	8	13	27	3	7	47
2012	10	0	9	46	19	17	30	25	26	26	14

Figure 2 demonstrates that significantly more capacity has been made available in the realistically dispatchable price bands. From observing the capacity offered in at between $30 and $70/MWh, it is clear that IPPs are offering in substantially more generation capacity than prior to the introduction of the balancing market within the range of realistically dispatchable price bands.

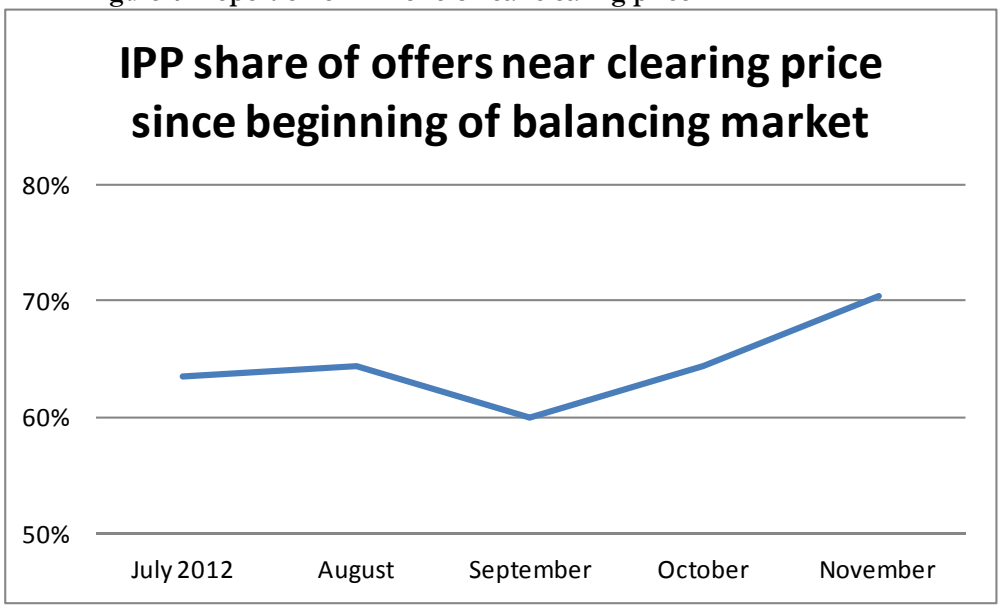
This analysis can be extended by looking at the amount of generation that is offered in at prices close to the marginal price. For this exercise, we have defined generation offered at prices close to marginal price to be generation offered within 10% of the final balancing price.

Figure 3 IPP offers in MW near clearing price



When expressed as a proportion of the offers near the clearing price we observe that IPPs are offering a significant market share of balancing. Figure 4 below shows that by November, the IPPs were offering 70% of the balancing capacity near to the clearing price, well in excess of their share of total generation, which is between 40% and 45%.

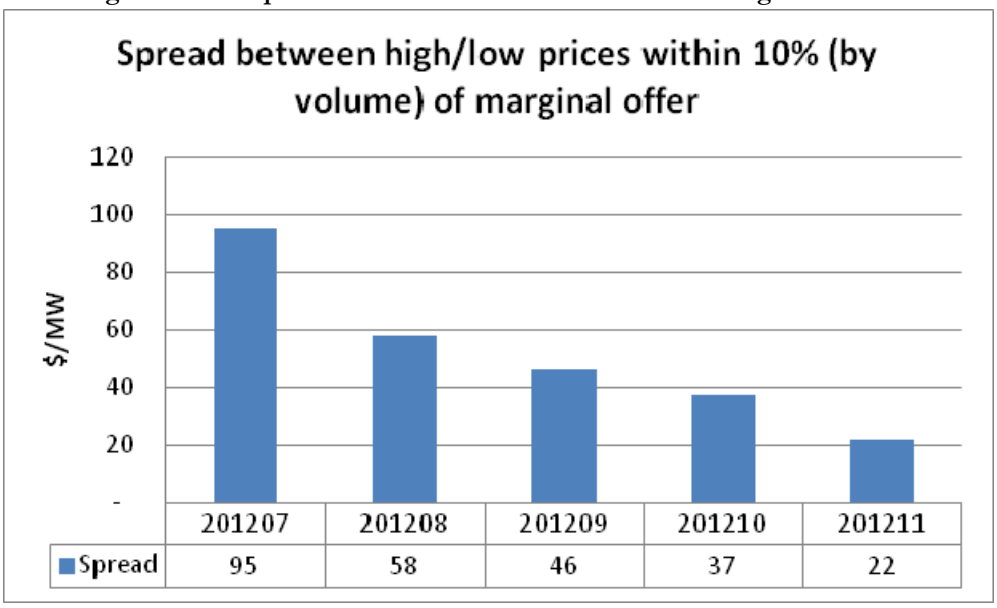
Figure 4 Proportion of IPP offers near clearing price



Importantly, the price spread of the nearest 10% of offers by volume to the cleared volume is shrinking, indicating greater competiveness. For example, if for a particular period, there is 2000MW of cleared volume, then we calculated the price spread between the offers ranked

at 1800MW and 2200MW in the merit order. This calculations shows that the price spread has shrunk since the inception of the balancing market as shown in figure 5 below.

Figure 5 Price spread of volume offered within 10% of marginal offer



To analyse whether this increased participation by IPPs has impacted on balancing costs we calculated the average price deviation of the balancing price from the STEM price. These calculations are shown in figure 6 below. This calculation allows us to visualise a comparison of balancing costs that corrects for different price levels and also for different physical balancing requirements.

Figure 6 Comparison of average price deviation from STEM during balancing

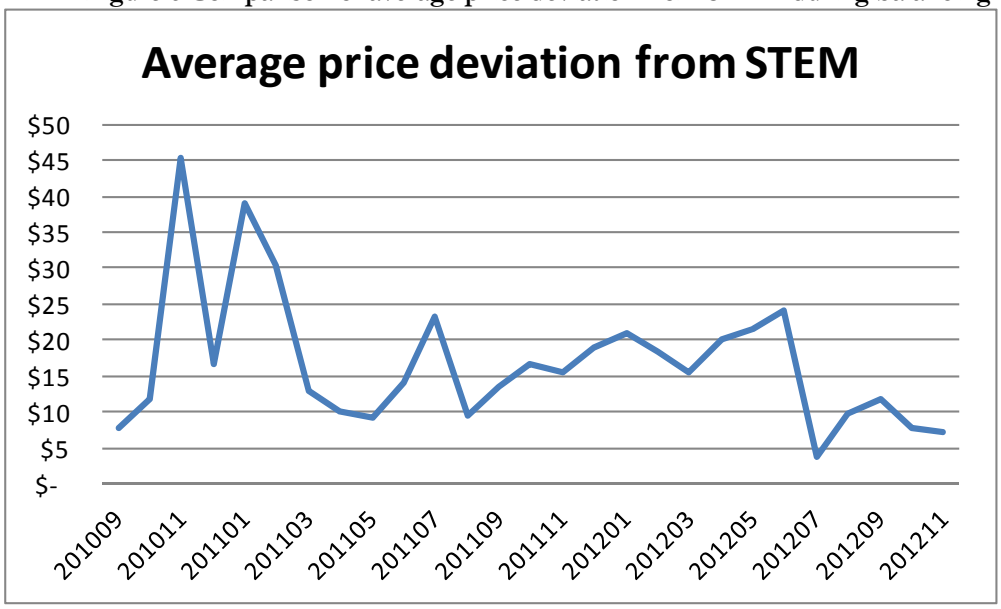
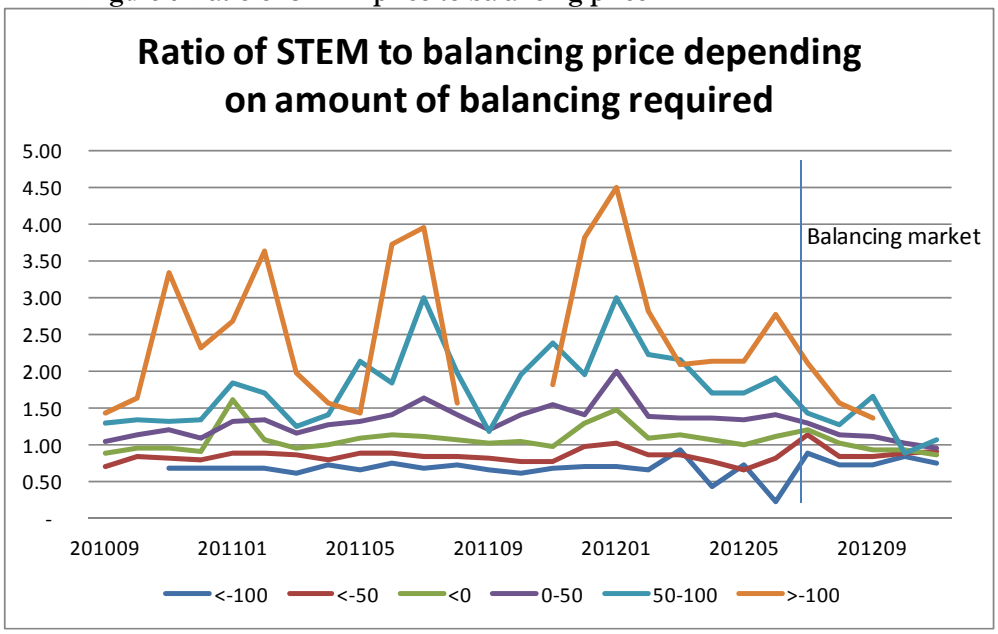


Figure 6 illustrates that following the introduction of competitive balancing there has been a sustained decrease in the price deviation that occurs when balancing is used.

To show this effect in more detail we show in figure 7 below the ratio of the balancing price to the STEM price depending on the amount of balancing required. Figure 7 shows that there has been a substantial narrowing of the deviation curves, indicating a benefit arising from the balancing market.

Figure 7 Ratio of STEM price to balancing price



We can quantify the benefit from this narrowing of the price variation between balancing and the STEM.

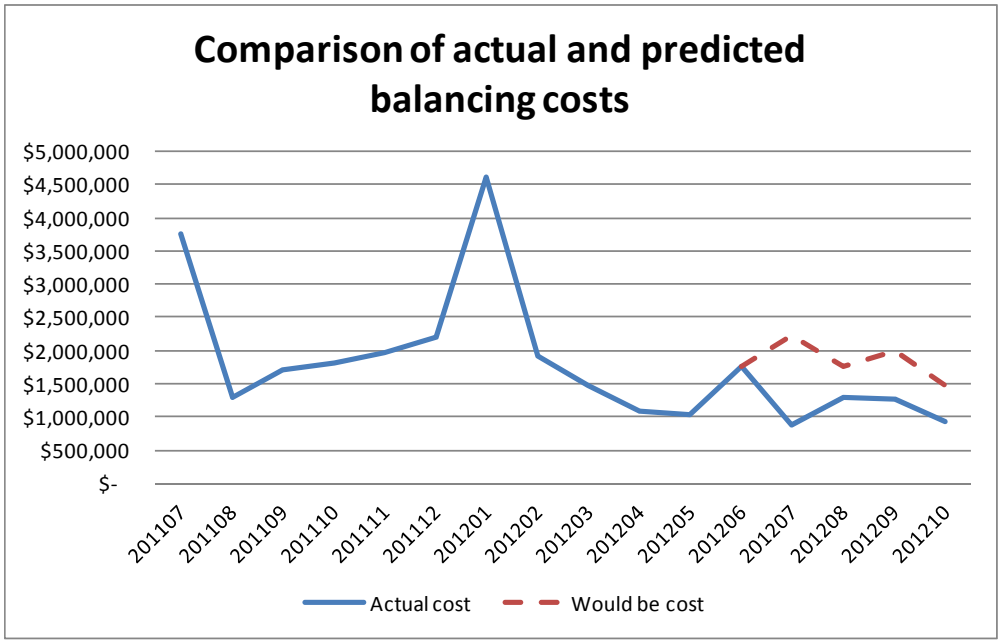
If the cost of balancing had remained at levels observed from 1 July 2011 to 30 June 2012 then the cost of balancing would have been $4.3 million more than observed over the first 4 months of the balancing market.[3] It is possible that this method results in an underestimate of the benefit of the balancing market because it does not adjust for the implementation of the carbon charge. The carbon charge might otherwise have resulted in an increase in the deviation of the pricing price from the STEM price.

If we extrapolate the estimated benefit of $4.3 million to an annual figure we would expect to see about $12.9 million in total benefits for the first full year of balancing. Because of the short time frame it is necessary to show some caution in extrapolating these results.

We illustrate these results graphically in figure 8 below:

[3] We have corrected for volume effects in determining this benefit

Figure 8 Comparison of actual costs and predicted costs without balancing market



Return of capacity from outages

In the April 2011 CBA, we assessed that the introduction of a balancing market would encourage and allow generators to return to the market earlier from planned outages in the event of major pricing events, such as another generator tripping out unexpectedly. We are not able to offer any conclusive analysis yet on this measure as there do not appear to have been any pricing events during the four month period that would have provided sufficient incentive to trigger the benefit.

Reduction in cycling

In the April 2011 CBA we assessed that a balancing market might reduce the amount of cycling of baseload plant.[4] We assessed the benefit of this at about $40,000 per event, and estimated number of events at 45 per annum.

Having reviewed data on market operation over the past four months we think that the number of annual events was an underestimate and is likely to be closer to 60, based on 20 avoided cycling events in the four month observation period. This suggests that the balancing market is providing about $2.4m annum in avoided costs of cycling baseload plant.

[4] Base load plant are designed to run more or less at a flat load and incur additional costs if required to ramp down and then ramp up in response to changes in demand.

Other benefits

The analysis above considered only those benefits that we expected to observe in the first instance, and which were quantifiable over the timeframe of the initial study. The April 2011 CBA also pointed to additional important benefits which were less amenable to quantification and/or do not result in purely economic outcomes (e.g., financial transfers that reduce costs for consumers). These additional effects are important as they influence behaviour and therefore indirectly affect outcomes that matter. Evidence from other market reforms cited in the April 2011 CBA suggest the benefits to consumers over the longer term from improved incentives and ability for participants to compete greatly exceed the sorts of quantifiable benefits estimated in this paper.

The evidence to date is that IPPs are responding to the incentives and opportunities provided by the balancing market in a manner that is enhancing economic efficiency and therefore the welfare of WA. Such behaviour increases confidence and can lead to a greater willingness to assess, manage and ultimately bear risk. The most obvious area where enhanced confidence is likely to manifest is in terms of investment, particularly in "balancing-capable" plant but also more widely across the wholesale electricity market. These effects are not straightforward to measure and are therefore not included in this note. However, they should be borne in mind when considering the impacts (and direction) of changes even at this relatively early stage.

Funding Comparison - Current v New Triennium

	Current Triennium				New Triennium			
	Actual/Budget							
Description	Actual 2010/11 [1] ($'000)	Actual 2011/12 [1] ($'000)	Budget 2012/13[2] ($'000)	Total ($'000)	Budget 2013/14 ($'000)	Budget 2014/15 ($'000)	Budget 2015/16 ($'000)	Total ($'000)
Employees Benefit Expense	$4,650	$5,093	$5,394	$15,137	$5,568	$5,851	$6,102	$17,521
Accommodation Costs	$335	$358	$204[4]	$897	$715	$753	$783	$2,251
Supplies and Services	$5,369	$5,236[3]	$4,470	$15,075	$5,064	$4,952	$4,984	$15,000
Borrowing Costs	$178	$532	$592	$1,302	$582	$391	$304	$1,277
Depreciation	$1,424	$2,004	$5,565[5]	$8,993	$3,946	$4,368	$4,563	$12,877
Total Expenditure	$11,956	$13,223	$16,225	$41,404	$15,875	$16,315	$16,736	$48,926
Less Interest Income	-$153	-$175	-$170	-$498	-$50	-$50	-$50	-$150
Nett Expenditure	**$11,803**	**$13,048**	**$16,055**	**$40,906**	**$15,825**	**$16,265**	**$16,686**	**$48,776**

Note:

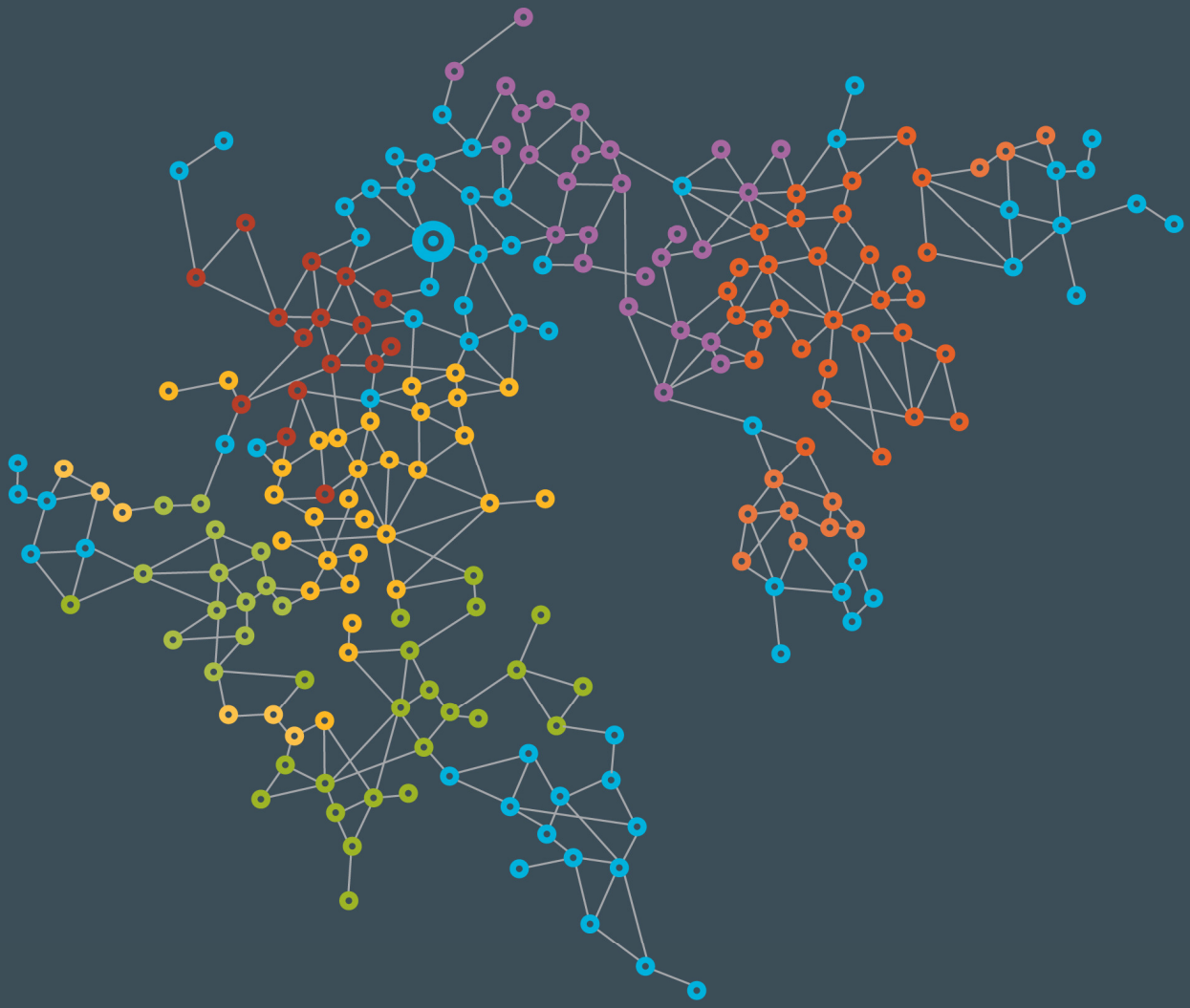
1. Per audited results.
2. Per approved 2012/13 Operational Plan approved by Minister for Energy.
3. Excludes $350,000 related to initial GISP activity, which was offset by corresponding revenue contribution from the Public Utilities Office.
4. Excludes $472,835 taken as "rent free" – provided for under new accommodation lease.
5. Depreciation budget reduces to $3,564,000 as a result of converting the effective useful life of IT assets from 3 years to 5 years – decision by IMO Board in October 2012, effective 1 July 2012.
6. The Western Australian State Budget 2012/13 Overview Paper provides annual CPI figures for Perth through to 2015/16. This identifies an effective indexation factor between the two Review Periods of 9.6%.

INDEPENDENT
MARKET
OPERATOR

Independent Market Operator

IT Roadmap 2013-2016

Date of Issue: 14th November 2012



CONTENTS

Independent Market Operator
DOCUMENT DETAILS

Title:	IT Roadmap 2013/14 -2015/16
Release Status:	Internal
Confidentiality Status:	IMO Confidential

Independent Market Operator
Level 17 Governor Stirling Tower,
197 St Georges Terrace, Perth WA 6000

Tel.	(08) 9254 4300
Fax.	(08) 9254 4399
Email:	imo@imowa.com.au
Website:	www.imowa.com.au

DOCUMENT CREATION

Author	Martin Maticka	Date	14/11/2012
Approved by	Allan Dawson	Date	14/11/2012

REVISION HISTORY

Rev .No.	Date Issued	Revision notes	Author	Approved by	Date Approved
0.1		Creation	Martin Maticka		
0.2	10-July-2012	IT Internal Review	Mark Brodziak		
0.3	25-July-2012	IMO Group Manager's Review	Martin Maticka		
0.4	17-Aug-2012	Peer review feedback	Martin Maticka		
0.5	29-Aug-2012	CEO Feedback	Martin Maticka		
1.0	11-Sep-2012	Version for IMO Board Comment	Martin Maticka		
1.1	26-Sep-2012	Updated budget	Martin Maticka		
1.2	17-Oct-2012	Submission for Board comment	Martin Maticka		
1.3	22-Oct-2012	Submission for Board Approval	Martin Maticka	IMO Board	14/11/2012

NEXT REVIEW DATE: June 2013

1. Executive Summary

The Independent Market Operator (IMO) administers and operates the Western Australian Wholesale Electricity Market (WEM) under the Market Rules. The IMO has also been appointed to operate the new Gas Information Services (GIS) for Western Australia. This service includes a Gas Bulletin Board (GBB), which is expected to commence operation by 1 July 2013.

The IT Roadmap is a strategic planning tool to ensure that the planning, delivery, management and use of the IMO's IT systems support the operation of WEMS, GIS and the IMO business.
The IT Roadmap has been developed to support the IMO's Allowable Revenue submission for the 3 year period ending 30 June 2016.

This IT Roadmap represents the third time the IMO has developed a technology roadmap. The first two IT Roadmaps achieved significant improvements to the performance of IMO's core IT systems.
The first Roadmap covered the period 1 July 2008 to 30 June 2010 with a key focus on the separation of the IMO Systems from the Department of Treasury and Finance (DFT). The separation from DFT entailed the setup and build of complete standalone infrastructure suitable to support the WEM. In addition the first IT Roadmap marked the introduction of webservices (Business to Business) interface to allow for automated reporting for participants.

The second Roadmap extended from 1 July 2010 to 30 June 2013 and included a large body of work to bring core systems (such as settlements and metering) up to date so they could be supportable by our strategic vendors. The implementation of the Market Evolution Project (MEP) during this period allowed the IMO to make considerable improvement and enhancements to the WEM systems. MEP delivered:

- a new Registration system;
- a real time balancing market;
- a real time Load Following Ancillary Services market; and,
- a significant enhancement in market transparency.

The MEP project achieved the strategic objective of extending the life of the WEM systems to the next milestone change in the WEM design or to at least 2015/2016 when the core system will be 10 years old.

IMO business changed considerably with the introduction of the new Balancing market on the 1st July 2012. Prior to this, WEM was a day ahead market and required a relativity low availability requirement – daily from 7:00 am to 3:00 pm. WEMS now runs and is required to be supported on a 24 hour a day basis. This has placed a much greater demand on the WEM systems and processes to ensure the market is not affected.

The change to WEM operations has had a significant impact on the core WEMS ABB System as they were not designed for such a dynamic market. It is also expected that the demands of the new balancing market on WEMs will ramp up as Market Participants get familiar with the new trading environment.

The IMO is faced with the long term strategic decision to either continue to invest significant capital and resources in our core ABB WEMS code base or to prepare replacement of the WEM code within the next 5 years. This is explored in greater detail and it is recommended that the IMO adopt the later strategy.

This, the third version of the Roadmap will include limited investment in extending WEMS (other than required by mandatory rule changes) and focus on market transparency improvements.

In summary, the IMO's third IT Roadmap will:

- Continue to maintain systems to ensure they remain current and supported by our vendors;
- Extend applications to support Market Participants that have a varying degree of technical sophistication;
- Maintain the strategic objective of enhancing market transparency; and
- Develop and implement integrated compliance and monitoring tools in the WEM Systems.

The depreciation model for IT capital has been revised (in conjunction with the IMO's finance team) from 3 to 5 years to reflect the current useful life of IT software and hardware investments. The targeted capital expenditure required to support the third IT Roadmap would be a reinvestment of 55%-60% of the IMO's current asset depreciation with a lower capital requirement in each year of the submission leading up to a potential system rebuild in 2016/2017.

The current WEM code base is targeted for replacement in either 2016/17 (it will be 10 years old) or when a significant WEM systems investment point occurs (i.e. constrained grid), whichever comes first. In the event of a WEMS rebuild in 2016/2017, the IMO would need to write-down all capital that could not be carried over to a new system. The capital write-down, based on the IMO's position on WEMS Intellectual Property ownership, would be approximately $841K in 2016/17 under this scenario.

2. Background

2.1 History

On formation of the IMO, all IT systems and process were run on the Department of Treasury and Finance (DTF) infrastructure. DTF's infrastructure and its business drivers (DTF did not operate outside of weekdays – WEM operated 7 days a week) were not suitable to run market systems and the IMO experienced several significant market outages due to infrastructure failures that occurred outside of normal business hours.

Due to these significant failures, the IMO's first IT Roadmap was established in December 2008 with an infrastructure focus to obtain separation and remove dependency on DTF systems and associated support. This was a period of significant investment in the purchasing and configuration of Server and Network infrastructure, much of which remains in place today.

The next significant challenge that needed to be addressed was the short comings of the WEMS applications delivered by ABB at Market commencement. The application that ABB delivered proved to be poorly designed and implemented, and contained a significant amount of obsolete technology. Initially ABB supported the WEM Systems under warranty, however whenever the IMO requested application changes, usually associated with a rule requirement, the system changes were costly and would take a considerable amount of time for ABB to implement.

In 2008 the IMO the system warranty period ended and Market System Support provided by ABB was replaced with Power Systems Consulting (PSC) as a result of a competitive tender process.

The second IT Roadmap was formulated with a Market applications focus and covered the period 1 July 2010 to 30 June 2013. This Roadmap was approved in October 2009 and outlined a challenging portfolio of work that included:

- Replacement of ABB Reporting interface;
- Removal of Participant certificate security access protocol;
- Upgrades to Metering and Settlements;
- Oracle version upgrades; and
- Removal of unsupported software such as the Rules Engine.

During the implementation of the second IT Roadmap the Market Evolution Program (MEP) commenced and provided the opportunity to deliver the more substantive deliverables within the strong governance framework of the Market Evolution Program (MEP). The MEP project achieved the strategic objective of extending the life of the WEM systems to the next milestone change in the WEM design or to at least 2015/2016 when the core system will be 10 years old.

The inclusion of IT Roadmap items with MEP proved to be successful, and significant progress was made in updating out of date software and delivering enhanced WEM systems. This included:

- Participant Registration;
- Participant User Management and RSA Security;
- Removal of obsolete technology in key areas (Rules Engine) and

- provision of Market Data to the ERA.

While significant progress has been made as a result of MEP, some roadmap projects had to be reprioritised and remain outstanding, including:

- the replacement of Microsoft Great Plains & associated Interface (MSGPI) ,
- MPI Phase 3 (full retirement of ABB interface functionality); and
- The development of compliance tools.

These deliverables have been reassessed and incorporated into this Roadmap.

2.2 IMO's Core IT Drivers

IMO's third IT Roadmap will continue to encapsulate the IMO core IT drivers. These remain unchanged and are stated below:

1. Reduction in the number of obsolete technologies used and the requirement to support them;
2. Provision of a stable, supportable IT base for future developments; and
3. Provision of Market Data and Systems to Market Participants.

The IMO will continue to look for opportunities to adhere these drivers while it delivers on the work program incorporated in this Roadmap.

2.3 Current IT Environment – Overview

Software/Systems

In general, the IMO's IT environment represents a mixture of functional applications (such as Settlements, Metering, RSA Security) and development technology (such as Java, C, Fortran and Perl). Parts of WEMS are overly complex, poorly documented, and difficult to test. Key parts of Settlements and Metering are tightly integrated with WEMS. Even small changes require extensive investigation and testing, making the IMO Market Systems relatively expensive to support and change. A core driver of the IT Roadmap is to continue to simplify the IMO's technology stack. While some progress has been made in this area, a sustained effort is required to address these constraints.

Western Australia provides a challenging environment to secure suitably qualified IT support IT professionals. For this reason the IMO has selected core mainstream technologies that
have a good support critical mass. The IMO's Core Technologies are Java, JUnit, Oracle DB, Spring Framework and JavaScript. These technologies ensure the IMO with the best chance of securing IT professionals to provide system support.

While the IMO has a number of other technologies in place, largely as a result of the initial ABB system implementation, those that are obsolete are being targeted for removal as part of this IT Roadmap.

Infrastructure/Hardware

With the full implementation of the MEP, and the commencement of the 24 hour a day market operations the development of monitoring systems to further support the WEM can commence. 24/7 markets must be reliable for them to remain credible and work efficiently. Based on this essential requirement, the IMO's

automated IT monitoring and alerting systems are in a relatively immature state. A significant amount of work was completed in the second IT Roadmap to get the hardware system up to date and within vendor support windows. This effort must be sustained to ensure that these systems remain up to date.

2.4 Business Issues

Business Issues have been classified internally and externally as follows:

Internally

Running WEMS is currently a resource intense activity. Progress has been made in simplifying the running of the market during the second IT Roadmap. Further simplification is planned so that the Market Operations team can commit more time in assisting Participants with their participation in WEM.

Rule Changes processed by the IMO result in an average of 10-15 system changes of varying sizes each year. Extensive manual testing is required for each Rule Change that is implemented. Automated testing tools and techniques will greatly assist in reducing test and deployment cycles so that the IMO can safely and efficiently implement the required rule and system changes.

The ability to perform robust analysis of market data for market monitoring (compliance and regulatory monitoring) has been hampered by the difficulty in efficiently getting access to market data when required. Associated tools required for this analysis are either unavailable or built from uncontrolled and unsupported systems (i.e. VB and Excel macros).

Externally

Access to market data and information on market activity is needed for the efficient operation of the WEM. System changes to support the new Balancing market have provided excellent tools to give visibility around that part of the market, but older parts of WEMS (e.g. bi-lateral contracts, STEM, resource plans, etc.) need to be improved to a similar standard. The IMO has been increasingly asked to support data provisioning requirements by extracting data on an ad-hoc basis. This will prove unsustainable in the medium term as market participants get familiar with the additional sophistication provided by the new balancing and LFAS markets.
For any market to be efficient, all participants must have fair and unfettered access to the same information. Participants will increasingly look to the IMO to provide this key aspect of the market.

Key external systems that the IMO systems integrates with, such as the System Management IT systems, requires significant review and upgrading. However the IMO is constrained in doing so as it requires both organisations to be in a position to implement such an upgrade. When System Management is in a position to invest and make changes in respect of their operation the IMO will take that opportunity to upgrade these interfaces. As such capital will need to be set aside to complete this when this opportunity occurs.

Market Participants have varying degrees of technical sophistication, which is largely dependent on the size and sophistication of their organisation. This is further complicated as the needs of Generators, Retailers and DSP are different, and a number of Participants operate from offices located outside of Western Australia. This variety of stakeholder capability and capacity poses a unique challenge to the IMO. The IMO needs to provide system functionality that supports the efficient operation of the WEM so as not to discriminate or present barriers to entry for new or small Market Participants.

2.5 WEM System Strategy

There is currently a significant gap between core ABB WEMS applications and the system requirements necessary to run a near real time electricity market.

ABB WEMS System capability, while operating adequately as a result of the technology investment made during the implementation of MEP, would rate at the lower end of the scale in being able to support a 24/7 market in the longer term. This low rating is largely due to:

- the framework delivered by ABB was not suitable for a 24/7 market, and as such significant ancillary processes are in place to provide the required level of stability to WEMS;
- the level of obsolete technology embedded in ABB WEMS components make the system difficult to extend and support;
- the amount of effort and cost required to resolve defects in obsolete Fortran and C code is very high;
- the lack of a comprehensive automated regression test suite for WEMS means that significant changes are currently tested manually. This process takes around 6 weeks to achieve good coverage; and
- limitations in the ability to extend the systems to accommodate changes such as new Market Rules. A significant shift in market design, such as a constrained grid, model would require a replacement of WEMS in its current form.

The IMO has come to a strategic crossroads on how best to allocate IT capital investment throughout the period covered by the IT Roadmap as well as in the long term. The strategic options considered were:

1. Initiate a project to redevelop the ABB components of WEMS;
2. Replace WEMS entirely with a suitable replacement product (or project); or
3. Work within limitations of the current system, implementing changes to reduce areas of technical risk until the next major investment point.

Options 1 or 2 would require a project of similar scale but greater capital investment to MEP. In the initial planning stages of MEP, the replacement of WEMS was estimated to cost in the order of $12million (in 2010) not including changes made to support MEP. Due to MEP investment into the ABB WEMS application, a further similar level of capital of investment should not be considered until the accounting value is significantly depreciated (3 years based on IMO current accounting practice) and a major market change is required (e.g. Constrained Grid). In the event of such a major change careful consideration will be made on what components could be carried over to a new system. IT Roadmap items under *Infrastructure Support (Market Systems*) would be likely to be carried over to any new system.

Option 3 represents a reasonable compromise; continue with incremental changes to WEMS for medium term to support Rule Changes, major defects and reduction in technical risk. A selection of projects was made to support this approach.

2.6 Objectives of the Third IT Roadmap

The objective of the third IT Roadmap is to:

1. Define IMO's approach to the application of technology;
2. Define IMO's approach to selective outsourcing;
3. Present a portfolio of capital work to support the IMO's strategic objectives to the 30 June 2016;

4. Provide a baseline of work that can be revised and adjusted as the IMO's business needs change; and
5. Provide a robust framework for the IMO's next ERA capital submission.

3. Approach

3.1 Application of Technology

The IMO's approach to technology can be categorised into the following broad themes:

Process / Automation / Design

The application of technology follows a "keep it simple" approach. Due to the size of the organisation, processes need to be lean, intuitive, and cost effective. Where appropriate, automation should be introduced to reduce repeated efforts.

Proactive / Ahead of issues

Systems need to provide sufficient monitoring capability so that the IMO can respond before these systems fail. To support this objective, a combination of integration and advance capacity planning is required with all system changes.

Consolidate technologies

The IMO has a large and diverse technology stack. Every effort needs to be made to reduce disparate technologies, and thereby reduce maintenance costs to the IMO.

Mainstream technology

The IMO has a key strategic driver to use mature, widely used and well supported technologies. The IMO has a preference to use technologies that have Perth based support readily available.

Solid infrastructure / Applications - "Markets Must Run"

When production IT infrastructure and applications do not run they can have a significant impact on the WEM. Both internal and external stakeholders may be affected. A significant IT failure could prove catastrophic to IMO operations. As such, the IMO needs to focus its efforts on ensuring that systems run, and (in the event of a failure) fail in a controlled manner. Backup systems and failover setups and application design should support a down-time of no greater than two hours from the time of critical failure.

Customer Focus /Business outcomes
All activities undertaken must directly support the efficient operation of the WEM and GIS.

3.2 Outsourcing

The use of outsourced providers at the IMO can be classified into the following two broad areas:

Infrastructure Support and Development

Infrastructure support and development covers all the physical hardware (Networks, Servers etc.) that the IMO is required to run. The complexity and breadth of the IMO infrastructure is large.

Due to the technical complexity of the IT environment the IMO requires access to a diverse and deep level of technical skills to keep systems operational. As a result of the efforts made during the implementation of the first and second IT Roadmaps the IMO's IT infrastructure environment is unlikely to significantly change in the foreseeable future. The IMO needs access to a large and diverse set of skills (Network, Hardware, Storage, Operating Systems, etc.) to ensure they are available when required, in some cases at short notice or after hours. To achieve this with a permanent internal team would result in poor utilisation of resources. A more cost effective approach is to outsource infrastructure support services to a professional supplier so that the IMO can get access to staff when required but only pay for time used.

Specialised Application Support and Development

The IMO currently runs two key applications, these being WEMS and Settlements. WEMS was supplied and customised by ABB (VENTYX). The Metering and Settlement systems are provided under a license agreement from Brady (formerly Navita).
Application support and development of both of these key systems is outsourced to domain specialists. This provides a sustainable level of support and the ability to expand the technical team for varying periods of time to support specific projects such as IMO Market Evolution Program (MEP). Access to market specialists provides the IMO with a strategic strength that would be extremely costly to build up in house.

A list of key service providers the IMO has ongoing contracts with is outlined in Appendix A.

4. Implementation Plan

4.1 Summary

While energy industry investments are often considered in decade long cycles, a 3 year IT Roadmap that is reviewed annually is appropriate for IT investment at the IMO to ensure our systems stay relevant for our evolving marketplaces, as:

- Technologies are continually evolving, and attempting to predict future directions is difficult;

- The limited lifecycle of the platform assets are typically between three and five years.
    - Once hardware warranties run out, physical maintenance costs rise substantially due to increased failure rate of components.
    - The risk of physical failure of hardware increases after 3 years and can increase the level of market down time.
    - Third party software packages need to be kept within the range of supported versions provided by the vendor. This strategy avoids escalating support costs and will ensure that appropriate support levels are available.
    - Systems development needs to be periodically aligned with the principles of the IT Roadmap ; and
    - Regular reviews of technology evolution are required to stay abreast of current tools and techniques to ensure that systems do not become technically obsolete within the asset depreciation period.

The IT Roadmap implementation plan has been categorised into the following areas:

- ***Corporate Support;***

- ***Wholesale Electricity Market Systems (WEMS);***

- ***Settlements;***

- ***Infrastructure Support (Market Systems);***

- ***Data / Information Provisioning; and***

- ***Gas Bulletin Board (GBB).***

To assist with the assessment of the implementation plan the IMO has conducted an internal review awarding maturity ratings (current, end of Roadmap target and system potential) to each of the categories.

The rating system applied as follows:

Id	Rating	Comment
1	Poor	Ad-hoc, unstructured, significant issues and gaps in systems or maturity of system increase organisation risk. System failures are largely unexpected and difficult to understand or determine. Lack of systems documentation or systems knowledge.
2	Repeatable	Basic level of documentation and understanding of system is in place. Short comings of the system have been defined. Failures of system occur in known weak parts of the system but can take time to resolve Implementation of changes are difficult and/or time consuming.
3	Defined	System provides appropriate level of business support and changes can be implemented v a good understanding of the overall impact. System failures occur, but can be quickly identified and resolved.
4	Managed	System provides good support to business process and associated IT failures are rare events. Changes are easier to implement and impacts/risks are known.
5	Best Practice	Best practice setup, system provides excellent support to business process; continued improvement is taking place.

4.2 Corporate Support (Non-Market Systems)

Assessment: Current level: 4; Target level: 4; Existing System Capability: 5

This area includes all projects that directly support administration activities of the organisation.

The IMO has been diligent in maintaining corporate systems and due to this maturity of process and the size of the IMO, the majority of the work in this area is in maintaining phones, Microsoft Office and the accounting system (MYOB) within vendor support windows. A small capital allocation is proposed to continue with the maintenance and standardisation of systems as opportunities occur.

Public Website

The IMO public website will have been static for four years at the start of this IT Roadmap. During this period IMO's business has changed considerably and a complete refresh is needed. Currently website maintenance and development resources are contracted out of state. This support structure has at times impeded the timely evolution of the public website. It is recommended that the development and management of the public website be changed to an organisation that can provide support locally.

Accounting System Upgrade

The upgrade of our accounting system is planned to ensure technical currency of our accounting package and to enable consolidation of the IMO's accounting requirements, including the removal of duplicated effort in maintaining MYOB for our corporate accounting and MSGP for Market related transactions.

Document Management System (DMS)

IMO needs to operate under the State Records Act for WA. Assessment, tool selection, project planning and implementation of a DMS need to occur to ensure that the IMO remains compliant.

Corporate System Enhancements

Corporate support will identify small capital projects over the execution of the IT Roadmap that will be required to extend and enhance system functionality. A small budget allocation has been requested to allow for the execution of these initiatives as opportunity presents.

4.3 Wholesale Electricity Market System (WEMS)

Assessment: Current level: 2; Ideal Target level: 4; Existing System Capability: 2

MEP resulted in a significant investment into WEMS. To support the Market Rule Change process and essential aspects of IMO's IT Strategy, a continued level of investment into the enhancement of the ABB WEMS will continue. The investment proposed for this portfolio of IT work is appropriate to ensure that the IMO can continue meetings its obligations but also not to over invest as it is likely WEMS will be rebuilt at the next major investment point.

Based on this strategic decision, proposed projects are:

Market Rule Changes - Non MEP

Outside of the implementation of MEP a number of Market Rule changes need to be implemented during 2012/2013 (http://www.imowa.com.au/rule-changes). This funding allows for the technical implementation of these required Market Rule changes.

Rectify backlog of participant identified defects

A review of all open defects raised by Participants since Market start to end of 2011 was completed. The budget requested addresses key defects of concern to Market Participants.

Implementation of small participant improvements

A review of all open improvement requests raised by Participants at the completion of MEP was completed in late 2011. This budget allocation allows for the implementation of small changes that provide business value to Market Participants.

Operational Tool Implementation and Automation

This project involves the integration of operational reporting tools into the WEMS. At present there are several Excel and SQL Server based tools that should be integrated into the existing WEMS database so that all reporting will be based on a single source of data. Excel based tools are difficult to maintain and control. A reduction in the variety of tools will reduce ongoing maintenance costs and potential compliance issues.

Fortran, C and Perl replacement

During 2011/2012 three significant market incidents were related to limitations of the legacy C and Fortran code used in WEMS. This code was delivered as part of the ABB code base at market implementation and includes technology that dates back to the 70's and written in the late 90's It is important to note that the availability of resources to support these legacy technologies is scarce, particularly in WA. The use of this legacy code has caused IMO a number of production issues during 2011/12 and was noted by the ERA in the *2011 Annual Wholesale Electricity Market Report for the Minister for Energy* as an area that required addressing by the IMO. The IT Road Map retains this as a priority to address either as part of this IT Roadmap or as part of a system rebuild in 2016/2017.

Replacement of spreadsheets

The IMO has implemented a number of Excel spreadsheets to perform key market functions. A number of these functions need to be moved into a robust controlled and supportable framework. The reliance on spreadsheets in operational tasks has been a feature of the annual market audits conducted by PA Consulting. PA noted back as far as 2007 that extensive use of spreadsheets should be reduced over time.

Spreadsheets identified for replacement are:

- Non-Temperature Dependant Load (NTDL) calculations*;*
- SRMC Model*;*
- IMO Operational Balancing Monitoring tool*;*
- Compliance analysis;
- Daily Operations and STEM Validation tool;
- IRCR Reconciliation Tool;
- Price Limits Tool (Alternate MAX STEM Price);
- Bulk Metering Validation Tool;
- Missing Meter Data Spreadsheet;
- NMI Check Digit Calculator;
- Month Generation Aggregation Spreadsheet;
- STEM Extract Tool for Settlements;
- Settlement Data Extraction Tool; and
- Short payment / Default Levies.

4.4 Metering and Settlements

Assessment: Current level: 3; Target level: 4; Existing System Capability: 4

Brady (formerly Navita) provides the IMO Metering and Settlement systems. To maintain support currency these systems need to be upgraded in-line with Brady's support window. Between 2006 and 2010, the IMO fell behind in Brady's support window. At one point Brady only had a single resource that had the required skills to support IMO's system. This placed a considerable key-person dependency risk on the IMO and a non-trivial amount of work has been required to return the systems into this support window so that Brady had multiple resources that could support and extend these systems for the IMO. This point was fully achieved in 2012. This significant achievement now enables the IMO to work towards updating systems to give added functionality.

Market Participants have requested a number of changes (such as automated report delivery) and enhancements that are not included as standard features in Brady's product and will be developed initially as modules. These now need to be factored into the IT Roadmap for delivery.

Links to Accounting and payment (MSGP/I) Replacement

Microsoft Great Plains and associated interface (MSGP/I) is used as the link between the Settlements software and IMO Accounting systems. The version of MSGPI running at the IMO is currently unsupported and presents a number of medium level security risks. Replacement is a matter of priority. This was originally scheduled to be completed as part of MEP during 2011/12 and will now be deferred to 2012/2013.

Brady - Metering – Upgrade

Regular upgrades are required to metering to ensure that the metering system is up-to-date and supportable with the vendor. These upgrades come with additional features that need to be considered for adoption by the IMO or not. These upgrades are more than BAU due to potential process changes that may need to take place.

Brady - Settlements – Upgrade

Regular upgrades are required to the Settlements systems to ensure that the Settlements are up-to-date and supportable with the vendor. These upgrades come with additional features that need to be considered for adoption by the IMO or not. These upgrades are more than BAU due to potential process changes that may need to take place. A future enhancement will look at introducing a *Business to Business (B2B) interface for Settlements (Web Services)* which will allow our customers tighter integration with IMO system, removing the manual overhead of the transfer of this data into their systems.

To enhance integration with Market Participants it is proposed to provide a B2B that is similar to what is provided for WEMS. This will allow an easier integration point for Participants rather than manually handling and uploading data.

Prudential Security Monitoring

The prudential Security Monitoring requires integration between WEMS and Settlements to be fully functional. The monitoring tool needs to be redesigned in with WEMS and Settlements to work in a robust framework to ensure that the tool is creditable and robust.

4.5 Infrastructure Support (Market Systems):

Assessment: Current level: 2; Target level: 4; Existing System Capability: 5

Infrastructure Support encompasses all capital items (Applications and Hardware) that are required to support the running of the Wholesale Electricity Market. A number of projects are required to enhance this area. Automated monitoring of both the technical systems (servers, networks, internet connection, etc.) and WEMS (events, submission errors) needs to be continually improved to minimise hardware failures and current hardware monitoring technology can often indicate a pending failure. WEMS needs to run on well-maintained IT infrastructure with further investment in line with end-of-life replacement schedules. Effective investment in this area is required to ensure that risk associated with IT failures is managed. The capital proposed will supersede any potential replacement of WEMS.

IT Systems Monitoring

This project covers the implementation of system monitoring of the IMO's critical systems. Effective automated monitoring is required as physical 24/7 presence of technical resources is unsustainable due to cost. Automated alerting to on call resources is much more cost effective. The current monitoring systems need to be extended across all of the IMO's critical processes. Suitable reporting dashboards will be provided to internal and external stakeholders.

System stability supported with effective monitoring has been a key concern for many of the Market Participants and is a key requirement for the effective management of the 24/7 Balancing market.

Deployment Automation

Deployment of production changes can be complex and involve multiple resources. Automated deployment of production changes removes the risk of introducing an unexpected and untested change due to human error. In addition deployments into production need to be automated as much as possible to reduce IT scheduled outage period times required to implement WEMS upgrades.

Automated deployments were first introduced during 2011/2012. An extension to this work to include the management and deployment of the database schemas is the next stage to put tighter control over the production environment, management and traceability of changes.

Development Environment Upgrade

The development and test environments need to be made more consistent with Production, and the implementation of automated refresh of production data into test environments will help reduce errors found during the test cycle due to data and environment errors.

Network / Infrastructure design – 5 year outlook

The migration of the current design and management of IMO infrastructure was completed in 2010. This was part of the migration during the first IT Roadmap with the separation from DTF. A medium/long term baseline and design needs to take place to ensure newer (and established) technologies are assessed in relation to the management of IMO infrastructure. Part of this process is to complete a security audit on the infrastructure to help baseline the current status of setup.

Infrastructure – Security Review / Upgrade

Stratsec has been awarded the contract to complete a security analysis on different aspects of the IMO's software and hardware infrastructure over a 2 year cycle. The work is likely to identify aspects of both hardware and software that needs to be improved, upgraded or replaced to ensure that the IMO's systems remain secure. A small capital assignment has been requested to undertake this work as required in line with other changes taking place in the IT environment.

Infrastructure End of Life Replacement

An up-lift is needed to replace hardware that has reached the end of its useful life. The use of IT hardware is on average five years. At five years, hardware is considered to be end-of-life and is disposed of. The first three years use is typically for production systems. Once maintenance costs escalate at the end of year three, equipment is moved for use in testing and developments for two years before disposal.

Reduction in schedule IT outage time

Currently IMO systems require 1-4 hours to deploy any new features into production. Failover between data centres takes 1.5 hours for the core WEMS systems. These are examples of regular activities that will take place on average every 2 to 4 weeks. As a long term goal, work needs to commence to help reduce these outage periods to lessen the impact on Market Participants now that the WEM is operating 24/7. A combination of software and hardware changes will be required.

Automatic Regression Test Suite

Contemporary software quality management requires the implementation of repeatable verification steps over parts of systems that result in significant impact if they contain errors. Due to the complexity of WEMS and the current time required to execute these tests manually, IMO will undertake the creation of a set of automatic regression tests over critical aspects (such as the STEM daily auction, or calculation of the Balancing Merit Order) of WEMS.

Removal of single points of failure to support Disaster Recovery plans

Currently WEMS has been designed in such a way that if any single component fails a full failover to the secondary data centre is required. Although such an "All-or-nothing" approach works, it has resulted in system outages of 2 hours that would have only needed to be 15 minutes if a single component was failed over. With a 24/7 market such outages have a greater impact and as a long term goal work needs to be completed at both an application and hardware level to reduce (and ultimately remove) single points of failure.

Disaster Recovery – Automation

The IMO's IT Systems require a lot of manual intervention to fail over between data centres. Whilst the IMO is not pursuing a High-Availability (HA) setup at present (primarily due to cost considerations) this may be revisited if Market Participants present a commercial case to do so. As IMO now runs a 24/7 market, overnight failures that would require three people to failover should be reduced to only require one. This will able the IMO to react quicker in such an event as aligning multiple resources can take some time. This work will be transferable going forward even in the case that WEMS is replaced as systems and procedures can be developed independently of WEMS.

Running the Market – Automation

This project is required to remove much of the low value repetitive work being performed by Market Operations in monitoring and validating the Market to free up time to support our market stakeholders in engaging with the WEM.

System Management / IMO Interface Re-implementation

Technical discussions between System Management and the IMO have indicated the method of file transfer (FTP) contains several points of failure. FTP transfer is a brittle and sub-industry standard for the exchange of data between businesses (B2B). Once System Management and the IMO have embedded the MEP and SMART programs of work, this interface should be reassessed. Capital reserve has been proposed to be included so that the IMO can move on this section of work when System Management is ready to do so.

External System Interfaces

External Interfaces to WEMS are inconsistent and difficult to use due to the initial delivery of the ABB system. As such these external interfaces to the IMO present a challenge to Market Participants as they need to have a deep understanding of how they work to successfully integrate. They are not fully documented and behaviour/structure is inconsistent. This makes it difficult for people to fully use the functionality provided by the IMO and may potentially lock off smaller players from implementation of Business to Business (B2B) solutions. Work initially needs to be completed to fully document these interfaces, then to update them to ensure they are clear, consistent and easy to use. This work is essential to help support automated test infrastructure.

4.6 *Data / Information Provision and Market Transparency*:

Assessment: Current level: 2; Target level: 4; Existing System Capability: 4

Effective provisioning of information is essential for Market Transparency and the efficient operation of the Market. This is aligned to WEM Market objective of promoting an economically efficient market.

The effective provision of information both internally and externally provides a significant opportunity to the IMO to become a hub for Market Data for the WA Energy sector. Effective provision of information is essential to address a number of IT and business opportunities, including quick and effective access to data and greater Market transparency. While the delivery of MEP resulted in significant improvement in Market transparency, more can be achieved in this area.

Minimal progress has been made in this area to date with only the ERA provided access to a duplicate copy of production database environment. At present, Participants access data via the WEMS MPI and 'mine' information from the IMO website. When further data is required, requests are placed directly with Market Operations for this information. In addition to being a resource intensive method to obtain data, this fragmented access can be error prone and is not subject to an independent QA process. The IMO needs to make a marked improvement in this area.

This area will be the next cornerstone of investment into the IT systems at the IMO.

Data Provision

The IMO currently produces a large amount of data and has a requirement to make this information available internally for Market Analysis and externally under the Market Rules.
This project is required to review the way this information is provided across all stakeholders to determine the most technically effective way to provide this information. This project will address the duplication of published Market data across IMO's website.

Market Transparency

A number of internal reports will be required as a result of the implementation of MEP. Initially it is expected that these reports will be created using a combination of data extracts and manual analysis of data. These reports will need to be later developed into a robust framework and ongoing reporting model.

Market Compliance

Tools need to be provided to the Market Compliance team so they have the ability to identify and investigate market behaviour as relating to rule compliance. Further common compliance issues need to be extended into a self-compliance framework within the MPI, so that rule breaches that can be systemically identified (e.g. Submission within Gate Closure) are flagged and then can be acknowledged and explained by the Participant with no prompting by the IMO.

4.7 Gas Bulletin Board (GBB)

In 2012/13 IMO initiated the Gas Information Services Project (GISP). This includes the establishment of a new GBB system which is a website displaying forecasts of gas production, transportation, storage and use in the WA natural gas network. The GBB system will be operated and maintained by the IMO. To maintain and extend this new system a level of ongoing investment will be required.

GBB Rule Changes
An asset allocation is required to support the GBB rule change process. This funding allows for the technical implementation of these as required.

GBB Extensions
To allow enhancements identified post GISP it is proposed to allocate a capital program to allow for this work. This may entail further integration in more established parts of IMO IT systems or implementation of appropriate market suggested enhancements that fall outside a rule change progress.

GBB Upgrades and Hardware Replacement

IT Technology changes at a rapid pace, by the end of this IT Roadmap a number of components of the GBB may need to be upgraded or replaced to ensure they stay within support windows from vendors

5. IT Roadmap / Capital Budget

5.1 *Intellectual Property (IP)*

Under the IMO's licence agreement with ABB, in addition to the relevant source code, ABB also retains ownership of the IP over all derivative code delivered for WEMS.

The IMO considers that:

- The IMO owns (or will own) the IP in the code relating to all investment in the following components of the IT Roadmap: Corporate Support, Infrastructure Support (Market Systems), Data / Information Provisioning and Gas Bulletin Board (GBB). The majority of these systems would be retained or modified as part of a rebuild and as such no write-off of capital would be required in the event of a rebuild;
- The IMO owns the IP in that part of the WEMS code created to support the IMO's second IT Roadmap and MEP;
- ABB owns the IP in all derivative code related to Reserve Capacity auction and STEM activity; and
- Brady (Navita) owns the IP in all code related to the Settlements and Metering systems.

However, the IMO is currently undergoing a process to determine ownership of all code including what is, or may be, derivative code under the contract licence agreement with ABB, as this will affect the size of a potential write-down of assets in the event of a full system rebuild.

5.2 Outline of Capital Request

The targeted capital expenditure required to support the third IT Roadmap would require a reinvestment of 55%-60% of the IMO's current asset depreciation with a lower capital requirement in each year of the submission leading up to a potential system rebuild in 2016/2017. This level of expenditure is similar to prior IT Roadmaps excluding the MEP capital requirement.

The assumptions around the capital requested to support the IMO's third IT Roadmap are:

- Five year depreciation model has been used across all components (hardware and software);
- WEMS rebuild would end current license agreement with ABB;
- Potential WEMS rebuild would occur during 2016/2017, as such a significant curtail of work associated with WEMS defects, enhancements and Rule Changes will occur in the preceding year; In the event of a WEMS rebuild in 2016/2017, the IMO would need to write-down all capital that could not be carried over to a new system. The capital write-down based on the IMO's position on IP as outlined above in 2016/17 would be approximately $841K.

The summary of Capex, Depreciation and write-down value for the WEM in and around the ERA submission is:

Summary of CAPEX, Depreciation and WDV for WEMS and Non WEMS					
WEMS	**2012/13**	**2013/14**	**2014/15**	**2015/16**	**2016/2017**
Opening WDV 1/7	3,026,121	11,411,047	8,793,547	5,910,646	3,177,260
Total Capex	11,481,000	653,600	384,560	248,797	248,797
Total Depreciation	3,096,075	3,271,100	3,267,461	2,982,182	2,584,691
WDV 30/6	**11,411,047**	**8,793,547**	**5,910,646**	**3,177,260**	**841,366**
Non - WEMS					
Opening WDV 1/7	480,227	2,118,588	3,270,297	3,777,765	3,875,589
Total Capex	2,045,000	1,948,800	1,616,240	1,481,797	1,481,797
Total Depreciation	406,638	797,091	1,108,772	1,383,973	1,603,592
WDV 30/6	**2,118,588**	**3,270,297**	**3,777,765**	**3,875,589**	**3,753,794**

The summary of Capex, Depreciation and write-down value for GISP in and around the ERA submission is:

Summary of Capex, Depreciation and WDV for GISP					
	2012/13	**2013/14**	**2014/15**	**2015/16**	**2016/2017**
Written down value starting 1/7		2,965,000	2,406,913	1,898,574	1,404,470
Capex	2,965,000	68,800	139,840	192,170	142,170
Total Assets	**2,965,000**	**3,033,800**	**2,546,753**	**2,090,744**	**1,546,640**
Depreciation		603,260	620,664	656,367	690,997
Total Depreciation		**626,887**	**648,180**	**686,274**	**722,351**
Written Value 30 June	**2,965,000**	**2,406,913**	**1,898,574**	**1,404,470**	**824,289**

The table below outlines an estimate expenditure required to support each of the proposed investment areas. The project estimates below are high-level based on a scope of similar types of projects. Yearly CAPEX budgets will be confirmed as part of IMO's yearly planning cycle and individual project budgets will be confirmed during initiation stage of the project.

The following table summarises estimate expenditure required to support each of the areas[1]:

[1] 2012/2013 for GBB includes total program costs, some of this is unrelated to IT spend but has been included as it affects capital depreciation profile.
[2]. Depreciation amounts in above tables still being refined, ready for submission to ERA 30 November 2012

IT ROAD MAP 2013/2014 to 2015/2016						
Id	Year	Core Requirment	2012/2013	2013/2014	2014/2015	2015/2016
Corporate Support (Non-Market Systems)						
	Public Website	No	$ 45,000	$ -	$ 69,920	$ -
	Remote Access Upgrade	Yes	$ 25,000	$ -	$ -	$ 25,000
	Accounting System Upgrade	No	$ -	$ -	$ -	$ 150,000
	Phone System Replacement	Yes	$ 100,000	$ -	$ -	$ -
	Document Management System	No	$ 25,000	$ 125,000	$ 50,000	$ -
	Corporate System Enhancements	No	$ -	$ 25,000	$ 25,000	$ 25,000
	Sub Total		$ 195,000	$ 150,000	$ 144,920	$ 200,000
Wholesale Electricity Market System (WEMS)						
	Market Rule Changes MEP	Yes	$ 50,000	$ -	$ -	$ -
	Market Rule Changes – Non MEP	Yes	$ 634,000	$ 206,400	$ 279,680	$ 213,254
	Reserve Capacity Test Extensions (RC)	No	$ 15,000	$ -	$ -	$ -
	Rectify backlog of participant identifed defects	No	$ 100,000	$ 206,400	$ 69,920	$ 35,542
	Implementation of particpant requested changes	No	$ -	$ 206,400	$ 34,960	$ -
	Operational Tool Implementation automation	Yes	$ 112,000	$ 34,400	$ -	$ -
	Fortran/C Replacement	No	-	$ -	$ -	$ -
	Sub Total		$ 911,000	$ 653,600	$ 384,560	$ 248,797
Settlements						
	MSPG / MSPGI Replacment	No	$ 112,000	$ -	$ -	$ -
	Navitia (Metering) – Upgrade	No	$ 75,000	$ 35,000	$ -	$ 35,000
	Navita (Settlements) – Upgrade	No	$ 75,000	$ -	$ 35,000	$ -
	Webservices for Settlements and Defined Interface	No	$ 54,000	$ 206,400	$ 34,960	$ -
	Prudential Monitoring	No	$ -	$ 126,400	$ -	$ -
	Sub Total		$ 316,000	$ 367,800	$ 69,960	$ 35,000
Infrastructure Support (Market Systems)						
	Spreadsheet replacements	No	$ 124,000	$ 137,600	$ 209,760	$ 216,000
	IT System Monitoring	Yes	$ 25,000	$ 34,400	$ 34,960	$ -
	Deployment Automation	No	$ 98,000	$ -	$ -	$ -
	Development Environment Upgrade	No	$ -	$ 34,400	$ -	$ -
	Network / Infrastructure Design – 5 year Outlook	No	$ 40,000	$ -	$ -	$ -
	Infrastructure - Security Review / Upgrade	Yes	$ -	$ 50,000	$ -	$ -
	Infrastructure - End Of Life Replacement	Yes	$ 300,000	$ 250,000	$ 250,000	$ 250,000
	Reduction in scheduled IT Outage Times	No	$ -	$ 75,000	$ -	$ -
	Removal of single points of failure	No	$ -	$ 126,400	$ 69,920	$ -
	Disaster Recovery - Automation	No	$ -	$ 68,800	$ 69,920	$ 71,085
	Running the Market - Automation	No	$ 112,000	$ 68,800	$ 69,920	$ 71,085
	Regression Test Suite (Test Automation)	No	$ 150,000	$ 126,400	$ -	$ -
	System Management / IMO Interface Re-implementation	No	$ -	$ -	$ 295,200	$ 216,000
	Sub Total		$ 849,000	$ 971,800	$ 999,680	$ 824,170
Data / Information Provision						
	Data Provision	No	$ 215,000	$ 68,800	$ 69,920	$ 71,085
	Business Reporting - Framework	Yes	$ 150,000	$ 68,800	$ -	$ -
	Market Transparency	No	$ 50,000	$ 68,800	$ 134,960	$ 135,542
	Compliance Tools	Yes	$ 270,000	$ 252,800	$ 196,800	$ 216,000
	Sub Total		$ 685,000	$ 459,200	$ 401,680	$ 422,627
MEP Transitional Support						
	MEP Transitional support from 1st July 5th Dec	No	$ 750,000	$ -	$ -	$ -
	Sub Total		$ 750,000	$ -	$ -	$ -
GBB						
	GIS Progam		$ 2,965,000	$ -	$ -	$ -
	Extensions	No	$ -	$ -	$ 69,920	$ 71,085
	Development of Rule Changes	Yes	$ -	$ 68,800	$ 69,920	$ 71,085
	IT Hardware/Software Replacement (3 yr cycle)	No	$ -	$ -	$ -	$ 50,000
	Sub Total		$ 2,965,000	$ 68,800	$ 139,840	$ 192,170
	GRAND TOTAL		**$ 6,671,000**	**$ 2,671,200**	**$ 2,140,640**	**$ 1,922,763**

Id	Portfolio Area		2012/2013	2013/2014	2014/2015	2015/2016
	Corporate Support (Non-Market Systems)		$ 195,000	$ 150,000	$ 144,920	$ 200,000
	Wholesale Electricity Market System (WEMS)		$ 911,000	$ 653,600	$ 384,560	$ 248,797
	Settlements		$ 316,000	$ 367,800	$ 69,960	$ 35,000
	Infrastructure Support (Market Systems)		$ 849,000	$ 971,800	$ 999,680	$ 824,170
	Data / Information Provision		$ 685,000	$ 459,200	$ 401,680	$ 422,627
	MEP Transitional Support		$ 750,000	$ -	$ -	$ -
	GBB		$ 2,965,000	$ 68,800	$ 139,840	$ 192,170
	GRAND TOTAL		**$ 6,671,000**	**$ 2,671,200**	**$ 2,140,640**	**$ 1,922,763**

6. Appendix A – Key IT Services Outsourced by the IMO

Organisation	Activity	Strategic Advantage	Contribution to Operational Performance
Application Support			
PSC Australia	WEMS Application Support	Specialist market knowledge and access to broad IT skill sets to extend and support current market systems	High
Brady Systems	Settlements / Metering	Specialist provider of settlement and metering software and associated support.	High
Outwide	Website	External website development and support. Access to expertise at low cost.	Medium
Noojee Telephony	Internal Phone support	Support for phone system. Legacy contract based on lowest cost award.	Low
Infrastructure Support			
ZettaServe	IT Infrastructure Support	Access to extensive skill set required to support complex systems needed for a 24/7 market.	High
Datacom Systems	Data Centre (Primary Site)	Professionally run Data Centre at fraction of cost to setup and run for size of IMO requirements.	Medium
ServiceNet	Data Centre (Secondary Site)	Professionally run Data Centre at fraction of cost to setup and run for size of IMO requirements.	Medium
Iron Mountain Data Protection Services	Backup tape storage	Specialised storage in secure location from Data Centres and Head Office.	Low