Verve Energy

Electricity Generation Licence (EGL7)

2013 Asset Management System Review

July 2013

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29 July 2013

Dear Andrew

2013 Asset Management System Review - Electricity Generation Licence EGL7

We have completed the Asset Management System Review for Verve Energy for the period 1 April 2010 to 31 March 2013 and are pleased to submit our report to you.

I confirm that this report is an accurate presentation of the findings and conclusions from our review procedures.

If you have any questions or wish to discuss anything raised in the report, please contact me on 08 9365 7024 or Andrew Baldwin on 08 9365 7236.

Yours sincerely

Richard Thomas
Partner

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1 Independent Reviewer's Report

With the Authority's approval, Deloitte Touche Tohmatsu was engaged to conduct a limited assurance review of Verve Energy's (**Verve Energy**) Electricity Generation Licence (EGL7) (**The Licence**) asset management system. Deloitte engaged KT & Sai Associates Pty Ltd to provide advice where technical expertise was required.

The review was conducted in accordance with the specific requirements of the Licence and the August 2010 issue of the *Audit Guidelines: Electricity, Gas and Water Licences* issued by the Authority (**Audit Guidelines**) for the period 1 April 2010 to 31 March 2013.

Verve Energy's responsibility for maintaining an effective asset management system

Verve Energy is responsible for putting in place policies, procedures and controls, which are designed to provide for an effective asset management system for assets subject to the Licences.

Our responsibility

Our responsibility is to express a conclusion on the effectiveness of Verve Energy's asset management systems to meet Licence requirements based on our procedures. We conducted our engagement in accordance with Australian Standard on Assurance Engagements *ASAE 3500 Performance Engagements* issued by the Australian Auditing and Assurance Standards Board and the Audit Guidelines, in order to state whether, based on the procedures performed, anything has come to our attention to indicate that Verve Energy had not established and maintained an effective asset management system for assets subject to the Licence, in accordance with the Audit Guidelines. Our engagement provides limited assurance as defined in ASAE 3500.

Our procedures were set out in the Review Plan, reviewed and agreed by the Authority and set out in Appendix A.

Limitations of use

This report is made solely to the management of Verve Energy for the purpose of its reporting requirements under section 14 of the *Electricity Industry Act 2004*. We disclaim any assumption of responsibility for any reliance on this report to any person other than the management of Verve Energy, or for any purpose other than that for which it was prepared. We disclaim all liability to any other party for all costs, loss, damages, and liability that the other party might suffer or incur arising from or relating to or in any way connected with the contents of our report, the provision of our report to the other party, or the reliance on our report by the other party.

Inherent limitations

A limited assurance engagement is substantially less in scope than a reasonable assurance engagement conducted in accordance with ASAE 3500 and consequently does not allow us to obtain assurance that we would become aware of all significant matters that might be identified in a reasonable assurance engagement. Accordingly, we will not express an opinion providing reasonable assurance.

We cannot, in practice, examine every activity and procedure, nor can we be a substitute for management's responsibility to maintain adequate controls over all levels of operations and its responsibility to prevent and detect irregularities, including fraud. Accordingly, readers of our reports should not rely on the report to identify all potential instances of non-compliance which may occur.

Any projection of the evaluation of the level of compliance to future periods is subject to the risk that the systems may become inadequate because of changes in conditions, or that the degree of compliance with management procedures may deteriorate.

Independence

In conducting our engagement, we have complied with the independence requirements of the Australian professional accounting bodies.

Conclusion

Based on our work described in this report, nothing has come to our attention to indicate that Verve Energy had not established and maintained an effective asset management system for assets subject to the Licence and in operation during the period 1 April 2010 to 31 March 2013.

Table 3 of this report provides effectiveness ratings for each of the 12 key processes in the asset management life-cycle. For those aspects of Verve Energy's asset management system that were assessed as having opportunities for improvement, relevant observations, recommendations and action plans are summarised at section 2.4 of this report and detailed at section 4 of this report.

DELOITTE TOUCHE TOHMATSU

Richard Thomas
Partner
Perth, 29 July 2013

2 Executive Summary

Introduction and background

The Economic Regulation Authority (**the Authority**) has, under the provisions of the *Electricity Industry Act 2004* (the **Act**), issued Electricity Generation Corporation (t/a Verve Energy) (**Verve Energy**) an Electricity Generation Licence (EGL7) (**the Licence**).

The licence relates to Verve Energy's operation of generating works at its Collie, Muja, Kwinana, Cockburn, Pinjar, Mungarra, Geraldton and Kalgoorlie power stations. The licence also relates to Verve Energy's wind farms at Albany, Grasmere, Esperance, Exmouth and Kalbarri and wind diesel systems in Bremer Bay, Coral Bay, Denham and Hopetoun.

Verve Energy has bilateral contractual obligations to supply electricity to other participants in the Wholesale Electricity Market (WEM). The majority of Verve Energy's electricity is sold to Synergy. Verve Energy currently provides about 53% of the generating capacity in the South West Integrated System (**SWIS**) and also had for the duration of the review period the responsibility of providing default balancing and ancillary services, which underpin the reliability of the SWIS network.

Section 14 of the Act requires Verve Energy to provide to the Authority with an asset management system review (the **review**) conducted by an independent expert acceptable to the Authority not less than once in every 24 month period. The Authority has elected to extend the period to be covered by the review to the 36 month period ending 31 March 2013.

The review has been conducted in accordance with the August 2010 issue of the *Audit Guidelines: Electricity, Gas and Water Licences* (**Audit Guidelines**), which sets out 12 key processes in the asset management life-cycle.

Findings

In considering Verve Energy's internal control procedures, structure and environment, its compliance arrangements and its information systems specifically relevant to those effectiveness criteria subject to review, we observed that Verve Energy:

- Has maintained consistent procedures and controls designed to provide for an effective asset management system
- Staff appeared to be competent for their roles, with an understanding of the asset management processes within their area of responsibility and were consistent in their reference to relevant corporate information and strategy
- Has regularly reviewed and enhanced elements of its asset management activities with the input of competent staff and external consultants, to ensure its assets are managed in accordance with its asset portfolio management philosophies.

This review assessed that:

- For the asset management process and policy definition adequacy ratings, 51 of the 55 elements of Verve Energy's asset management system are rated as "Adequately defined", three elements are rated as "Requires some improvement" and one is not rated
- For the Asset management performance ratings, 46 of the 55 elements of Verve Energy's asset management system are rated as "Performing effectively", eight elements are rated as having "Opportunity for improvement" and one is not rated
- There are four opportunities for improvement where further action is recommended, however no recommendations have been made in relation to risk management. In hindsight some actions taken to mitigate risks might be challenged, but our assessment indicated that the Verve Energy risk management process was adequately defined and that no further process improvements were required. We note that the Authority's Guidelines do not mandate recommendations for performance rating 2 "Opportunity for improvement".

Specific assessments for each criterion are summarised at **Table 3** in section 3 "Summary of findings" of this report.

Detailed findings, including relevant observations, recommendations and action plans are located in section 4 "Detailed findings, recommendations and action plans" of this report.

Asset portfolio

Verve Energy operates in a competitive market with significant compliance obligations. Verve Energy's asset management philosophy[1] is to achieve an effective balance between its short term operational requirements and the need to maintain the long term performance, availability and reliability of its portfolio of assets. This portfolio approach enables the management of planned outages from a whole of portfolio perspective, within the boundaries of asset specific capacity requirements.

This review was designed to consider whether anything has come to our attention to indicate that Verve Energy had not established and maintained an effective asset management system for assets subject to the Licence, in accordance with the Audit Guidelines. We specifically considered Verve Energy's power stations at Muja and Kwinana, plus the Gas Turbines and Sustainable Operations (GTSO) Branch.

For much of the review period, the Muja AB asset was not operational. The chronology of key events relevant to Muja AB is explained at the start of section 4 "Detailed findings, recommendations and action plans" of this report. Since limited operational activity has occurred during the period subject to this review, the extent of this review's consideration of the Muja AB asset was primarily limited to the asset planning, asset creation, maintenance, risk management and contingency planning functions.

Events since the end of the review period

A number of significant events have occurred since 31 March 2013, the end of the review period. Knowledge of these events will assist the reader in understanding and putting into context many of the findings in this report:

- Muja AB Unit 3 was certified to commence commercial operations on 1 April 2013[2]
- On 25 June 2013, the government announced its decision to suspend the refurbishment of Muja AB Units 1 and 2 units. Units 1 and 2 were put into site safe mode – pending further engineering and financial review. At the time of writing, there is uncertainty regarding the future of Units 1 and 2, plus the related JV arrangements in place
- Also in late June 2013, the government announced its decision to retire the Kwinana Power Station Stage C in 2015
- Announcement of new Board for proposed merged Verve Energy and Synergy in early July 2013.

Verve Energy's response to previous review recommendations

This review considered how Verve Energy has progressed against the two action plans detailed in the 2010 asset management system review report.

Our assessment of Verve Energy's progress is that both the 2010 action plans have been completed.

Refer to section 5 of this report for further detail.

[1] As referenced in Verve Energy's Portfolio Asset Mission reports

[2] Muja AB Unit 4 had been certified to commence commercial operations on 19 February 2013

Recommendations and action plans

AMS Key Process and Effectiveness Criteria	Adequacy rating	Performance rating	Issue 1/2013
Asset operations *5(e) Staff receive training commensurate with their responsibilities*	Requires some improvement (B)	Opportunity for improvement (2)	In relation to the Kwinana Power Station, the extent of operator access to the Plant DCS system (as identified through the 2009 ERAP assessment) creates a minor exposure to operational errors and potential accidents. Current operator access levels allow operators to potentially alter parameters in protection systems, alarm limits and bypass permissives. More focussed operator training and review procedures can further minimise this risk.

Recommendation 1/2013

Verve Energy:

(a) Review the extent of operator access to the Kwinana Power Station Plant DCS system, with the objective of further minimising the risk of operational errors and potential accidents

(b) Where appropriate, implement:

- Focussed operator training
- Review procedures, including the requirement for least two operators to sign off on changes in DCS procedures.

Action Plan 1/2013

Verve Energy will:

1. Provide evidence of its review of the extent of operator access to the Kwinana Power Station Plant DCS system, with the objective of further minimising the risk of operational errors and potential accidents;
2. Where appropriate, implement focused operator training regarding the Kwinana Power Station Plant DCS system; and
3. Provide evidence of its review of procedures regarding the Kwinana Power Station Plant DCS system, including whether or not there should be a requirement for at least two operators to sign off on changes in DCS procedures.

Responsible Person: Manager Portfolio Development & Optimisation

Target Date: December 2013

AMS Key Process and Effectiveness Criteria	Adequacy rating	Performance rating	Issue 2/2013
Asset maintenance *6(b) Regular inspections are undertaken of asset performance and condition*	Adequately defined (A)	Opportunity for improvement (2)	A significant amount of forward planning for Kwinana Power Station assets had been affected by the uncertainty surrounding the plant closure/retirement date, which has only been clarified by a government decision in late June 2013 to retire the plant in 2015. A confirmed retirement date was critical for the optimum management of asset life to be aligned with the retirement date and for a thorough Optimum Maintenance Spend Plan to be produced. The 2009 Engineering Risk Assessment Process assessment confirmed the planned critical risk reduction strategies such as improved engineering resources on site, replacing ageing electrical components, etc. Although the extent of the improvement works undertaken to improve the condition of the plant is constrained by the official plant closure date of 2015, Verve Energy is expected to continue to manage the safety critical risks of thermal fatigue and corrosion type issues. Effective options for managing those risks are to implement Acoustic Leak Detection Systems and to minimise the 2-shifting operations of the plant. As other planned risk reduction works are ongoing the next ERAP assessment should clarify the residual risk profile of the plant.
Recommendation 2/2013 In order to most effectively control thermal fatigue issues in Kwinana Power Station assets, Verve Energy consider: (a) Minimising two shift operations (b) Installing an acoustic leak detection system.		**Action Plan 2/2013** Verve Energy notes the June 2013 State Government decision to retire Kwinana Power Station Stage C from October 2015. Within this context Verve Energy will consider what options to most effectively control thermal fatigue issues in Kwinana Power Station assets are appropriate for the remainder of its life. This review will include consideration of the appropriateness of: • Minimising two shift operations; and • Installing an acoustic leak detection system. **Responsible Person:** Manager Portfolio Development & Optimisation **Target Date:** December 2013	

AMS Key Process and Effectiveness Criteria	Adequacy rating	Performance rating	Issue 3/2013
Asset maintenance *6(c) Maintenance plans (emergency, corrective and preventative) are documented and completed on schedule*	Adequately defined (A)	Opportunity for improvement (2)	In instances where recommendations are made by the detailed MetLab reports prepared as part of outage reporting, Verve Energy's processes provide for work orders to be raised to address those recommendations. As those processes do not provide a procedural link between the relevant recommendations and completed work orders, there is a minor improvement opportunity to more effectively track action taken to close out those recommendations.
Recommendation 3/2013 Verve Energy implement a procedure to facilitate tracking of progress on recommendations in the outage closeout report by linking those recommendations with the consequent work orders raised.		**Action Plan 3/2013** Verve Energy will develop and implement a procedure to facilitate tracking of progress on recommendations in the outage closeout report by linking those recommendations with the consequent work orders raised. **Responsible Person:** Manager Portfolio Development & Optimisation **Target Date:** December 2013	

AMS Key Process and Effectiveness Criteria	Definition adequacy	Performance rating	Issue 4/2013
Review of AMS *12(a) A review process is in place to ensure that the asset management plan and the asset management system described therein are kept current* *12(b) Independent reviews (e.g. internal audit) are performed of the asset management system*	Requires some improvement (B)	Opportunity for improvement (2)	Although components of Verve Energy's asset management system are subject to regular review and update, a formal process has not been established for ensuring the currency of the asset management system (including the currency of the collective references, which describe that system). There is also some doubt as to whether there has been any "substantial" change to Verve Energy's asset management system, which would warrant notification to the Authority per section 14(1) (b) of the Act.
Recommendation 4/2013 Establish a formal review process for ensuring the currency of the asset management system, including the currency of the collective references, which describe that system. Such a formal process should also address the need for a sufficient degree of independence in that review.		**Action Plan 4/2013** Verve Energy will establish a formal review process for ensuring the currency of the asset management system, including the currency of the collective references, which describe that system. **Responsible Person:** Manager Portfolio Development & Optimisation **Target Date:** December 2013	

Scope and objectives

The objective of the review was to independently examine the effectiveness and performance of the asset management system established for Verve Energy's assets subject to Verve Energy's electricity generation licence for the period 1 April 2010 to 31 March 2013.

In accordance with the Audit Guidelines, the review considered the effectiveness of Verve Energy's existing control procedures within the following 12 key processes in the asset management life-cycle.

#	Key processes	Effectiveness criteria
1	Asset planning	(a) Planning processes and objectives reflect the needs of all stakeholders and is integrated with business planning (b) Service levels are defined (c) Non-asset operations (e.g. demand management) are considered (d) Lifecycle costs of owning and operating assets are assessed (e) Funding options are evaluated (f) Costs are justified and cost drivers identified (g) Likelihood and consequences of asset failure are predicted (h) Plans are regularly reviewed and updated.
2	Asset creation and acquisition	(a) Full project evaluations are undertaken for new assets, including comparative assessment of non-asset solutions (b) Evaluations include all life-cycle costs (c) Projects reflect sound engineering and business decisions (d) Commissioning tests are documented and completed (e) Ongoing legal/environmental/safety obligations of the asset owner are assigned and understood.
3	Asset disposal	(a) Underutilised and underperforming assets are identified as part of a regular systematic review process (b) The reasons for under-utilisation or poor performance are critically examined and corrective action or disposal undertaken (c) Disposal alternatives are evaluated (d) There is a replacement strategy for assets.
4	Environmental analysis (all external factors that affect the system)	(a) Opportunities and threats in the system environment are assessed (b) Performance standards (availability of service, capacity, continuity, emergency response, etc.) are measured and achieved (c) Compliance with statutory and regulatory requirements (d) Achievement of customer service levels.
5	Asset operations	(a) Operational policies and procedures are documented and linked to service levels required (b) Risk management is applied to prioritise operations tasks (c) Assets are documented in an Asset register, including asset type, location, material, plans of components, an assessment of assets' physical/structural condition and accounting data (d) Operational costs are measured and monitored (e) Staff receive training commensurate with their responsibilities.

#	Key processes	Effectiveness criteria
6	Asset maintenance	(a) Maintenance policies and procedures are documented and linked to service levels required (b) Regular inspections are undertaken of asset performance and condition (c) Maintenance plans (emergency, corrective and preventative) are documented and completed on schedule (d) Failures (including the significance of the failure) are analysed and operational/maintenance plans adjusted where necessary (e) Risk management is applied to prioritise maintenance tasks (f) Maintenance costs are measured and monitored.
7	Asset management information system	(a) Adequate system documentation for users and IT operators (b) Input controls include appropriate verification and validation of data entered into the system (c) Logical security access controls appears adequate, such as passwords (d) Physical security access controls appear adequate (e) Data back-up procedures appear adequate (f) Key computations related to licensee performance reporting are materially accurate (g) Management reports appear adequate for the licensee to monitor licence obligations.
8	Risk management	(a) Risk management policies and procedures exist and are being applied to minimise internal and external risks associated with the asset management system (b) Risks are documented in a risk register and treatment plans are actioned and monitored (c) The probability and consequences of asset failure are regularly assessed.
9	Contingency planning	Contingency plans are documented, understood and tested to confirm their operability and to cover higher risks
10	Financial planning	(a) The financial plan states the financial objectives and strategies and actions to achieve the objectives (b) The financial plan identifies the source of funds for capital expenditure and recurrent costs (c) The financial plan provides projections of operating statements (profit and loss) and statement of financial position (balance sheets) (d) The financial plan provide firm predictions on income for the next five years and reasonable indicative predictions beyond this period (e) The financial plan provides for the operations and maintenance, administration and capital expenditure requirements of the services (f) Significant variances in actual/budget income and expenses are identified and corrective action taken where necessary.
11	Capital expenditure planning	(a) There is a capital expenditure plan that covers issues to be addressed, actions proposed, responsibilities and dates (b) The plan provide reasons for capital expenditure and timing of expenditure (c) The capital expenditure plan is consistent with the asset life and condition identified in the asset management plan (d) There is an adequate process to ensure that the capital expenditure plan is regularly updated and actioned.

#	Key processes	Effectiveness criteria
12	Review of Asset Management System	(a) A review process is in place to ensure that the asset management plan and the asset management system described therein are kept current (b) Independent reviews (e.g. internal audit) are performed of the asset management system.

Each key process and effectiveness criteria is applicable to Verve Energy's Licence and as such were individually considered as part of the review. The Review Plan set out at Appendix A details the risk assessments made for and review priority assigned to each key process and effectiveness criteria.

Approach

Our approach for this review involved the following activities, which were undertaken during the period March to June 2013:

- Utilising the Audit Guidelines and Reporting Manual as a guide, development of a risk assessment, which involved discussions with key staff and document review to assess relevant controls
- Development of a Review Plan (see **Appendix A**) for approval by the Authority
- Correspondence and interviews with Verve Energy staff to gain understanding of process controls in functions such as planning, asset operations, finance, internal audit and capital expenditure planning (see **Appendix B** for staff involved)
- Visited Verve Energy's power stations at Muja CD and Kwinana, plus the GTSO Branch Kewdale office with a focus on understanding the installation, their function and normal modes of operation, their age and an assessment of the installation against the AMS review criteria
- Consideration of Verve Energy's management of planned outage rates, particularly at the facilities listed on page xiv of the 2011 Annual Wholesale Electricity Market Report for the Minister for Energy (Muja G7, Kwinana G5, Kwinana G6 and Pinjar GT11)
- Review of documents, processes and controls to assess the overall effectiveness of Verve Energy's asset management systems (see **Appendix B** for reference listing)
- Consideration of the level of staff resourcing applied to maintaining those controls and processes
- Reporting of findings to Verve Energy for review and response.

3 Summary of findings

In accordance with the Audit Guidelines, the assessment of both the process and policy definition rating (refer to **Table 1**) and the performance rating (refer to **Table 2**) for each of the key asset management system processes is performed using the below ratings.

For the avoidance of doubt, these ratings do not provide reasonable assurance. Please refer to Section 1 of this report, specifically Inherent Limitations.

Table 1: Asset management process and policy definition adequacy ratings

Rating	Description	Criteria
A	Adequately defined	• Processes and policies are documented • Processes and policies adequately document the required performance of the assets • Processes and policies are subject to regular reviews, and updated where necessary • The asset management information system(s) are adequate in relation to the assets that are being managed.
B	Requires some improvement	• Process and policy documentation requires improvement • Processes and policies do not adequately document the required performance of the assets • Reviews of processes and policies are not conducted regularly enough • The asset management information system(s) require minor improvements (taking into consideration the assets that are being managed).
C	Requires significant improvement	• Process and policy documentation is incomplete or requires significant improvement • Processes and policies do not document the required performance of the assets • Processes and policies are significantly out of date • The asset management information system(s) require significant improvements (taking into consideration the assets that are being managed).
D	Inadequate	• Processes and policies are not documented • The asset management information system(s) is not fit for purpose (taking into consideration the assets that are being managed).

Table 2: Asset management performance ratings

Rating	Description	Criteria
1	Performing effectively	• The performance of the process meets or exceeds the required levels of performance • Process effectiveness is regularly assessed and corrective action taken where necessary.
2	Opportunity for improvement	• The performance of the process requires some improvement to meet the required level • Process effectiveness reviews are not performed regularly enough. • Process improvement opportunities are not actioned.
3	Corrective action required	• The performance of the process requires significant improvement to meet the required level • Process effectiveness reviews are performed irregularly, or not at all • Process improvement opportunities are not actioned.
4	Serious action required	• Process is not performed, or the performance is so poor that the process is considered to be ineffective.

This report provides:

- A breakdown of each function of the asset management system into sub-components as described in the Audit Guidelines. This approach is taken to enable a more thorough review of key processes where individual components within a larger process can be of greater risk to the business therefore requiring different review treatment
- A summary of the ratings applied by the review (**Table 3**) for each of:
    - Asset management process and policy definition adequacy (**definition adequacy rating**)
    - Asset management performance (**performance rating**).
- Detailed findings, including relevant observations, recommendations and post review implementation plans (**Section 4**).

Table 3: Asset management system effectiveness summary

Refer to Detailed Findings at section 4 and Review Plan at Appendix A for descriptions of the effectiveness criteria.

						Ratings	
Criteria	Consequence	Likelihood	Inherent Risk	Control Risk	Review Priority	Definition adequacy	Performance
1. Asset planning						**A**	**1**
1(a)	Minor	Probable	Low	Moderate	Priority 5	A	1
1(b)	Minor	Probable	Low	Moderate	Priority 5	A	1
1(c)	Minor	Probable	Low	Moderate	Priority 5	A	1
1(d)	Moderate	Probable	Medium	Moderate	Priority 4	A	1
1(e)	Minor	Probable	Low	Moderate	Priority 5	A	1
1(f)	Moderate	Unlikely	Medium	Moderate	Priority 4	A	1
1(g)	Major	Probable	High	Moderate	Priority 2	A	1
1(h)	Minor	Unlikely	Low	Moderate	Priority 5	A	1
2. Asset creation and acquisition						**A**	**1**
2(a)	Moderate	Unlikely	Medium	Moderate	Priority 4	A	1
2(b)	Moderate	Probable	Medium	Moderate	Priority 4	A	1
2(c)	Moderate	Unlikely	Medium	Moderate	Priority 4	A	1
2(d)	Moderate	Unlikely	Medium	Moderate	Priority 4	A	1
2(e)	Major	Unlikely	High	Moderate	Priority 2	A	1
3. Asset disposal						**A**	**1**
3(a)	Minor	Unlikely	Low	Moderate	Priority 5	A	1
3(b)	Minor	Probable	Low	Moderate	Priority 5	A	1
3(c)	Minor	Probable	Low	Moderate	Priority 5	A	1
3(d)	Moderate	Unlikely	Medium	Moderate	Priority 4	A	1
4. Environmental analysis						**A**	**1**
4(a)	Moderate	Probable	Medium	Moderate	Priority 4	A	1
4(b)	Moderate	Probable	Medium	Moderate	Priority 4	A	1
4(c)	Moderate	Probable	Medium	Moderate	Priority 4	A	1
4(d)	Moderate	Unlikely	Medium	Moderate	Priority 4	A	1
5. Asset operations						**A**	**1**
5(a)	Moderate	Probable	Medium	Strong	Priority 4	A	1
5(b)	Moderate	Probable	Medium	Moderate	Priority 4	A	1
5(c)	Moderate	Probable	Medium	Moderate	Priority 4	A	1
5(d)	Moderate	Probable	Medium	Moderate	Priority 4	A	1
5(e)	Moderate	Probable	Medium	Moderate	Priority 4	B	2
6. Asset maintenance						**A**	**2**
6(a)	Major	Unlikely	High	Strong	Priority 2	A	1
6(b)	Moderate	Unlikely	Medium	Strong	Priority 4	A	2
6(c)	Major	Probable	High	Moderate	Priority 2	A	2
6(d)	Major	Probable	High	Moderate	Priority 2	A	1
6(e)	Major	Probable	High	Moderate	Priority 2	A	1
6(f)	Moderate	Unlikely	Medium	Moderate	Priority 4	A	1

						Ratings	
Criteria	Consequence	Likelihood	Inherent Risk	Control Risk	Review Priority	Definition adequacy	Performance
7. Asset management information system						**A**	**1**
7(a)	Minor	Probable	Low	Moderate	Priority 5	A	1
7(b)	Minor	Probable	Medium	Moderate	Priority 5	A	1
7(c)	Minor	Probable	Low	Moderate	Priority 5	A	1
7(d)	Minor	Probable	Low	Moderate	Priority 5	A	1
7(e)	Moderate	Probable	Medium	Moderate	Priority 4	A	1
7(f)	Minor	Probable	Low	Moderate	Priority 5	Not rated	Not rated
7(g)	Minor	Probable	Low	Moderate	Priority 5	A	1
8. Risk management						**A**	**2**
8(a)	Major	Probable	High	Moderate	Priority 2	A	2
8(b)	Moderate	Probable	Medium	Moderate	Priority 4	A	2
8(c)	Moderate	Probable	Medium	Moderate	Priority 4	A	2
9. Contingency planning						**A**	**1**
9(a)	Major	Probable	High	Strong	Priority 2	A	1
10. Financial planning						**A**	**1**
10(a)	Minor	Unlikely	Medium	Moderate	Priority 4	A	1
10(b)	Minor	Probable	Low	Moderate	Priority 5	A	1
10(c)	Minor	Unlikely	Low	Moderate	Priority 5	A	1
10(d)	Minor	Probable	Low	Moderate	Priority 5	A	1
10(e)	Minor	Unlikely	Medium	Moderate	Priority 4	A	1
10(f)	Moderate	Unlikely	Medium	Moderate	Priority 4	A	1
11. Capital expenditure planning						**A**	**1**
11(a)	Moderate	Probable	Medium	Moderate	Priority 4	A	1
11(b)	Minor	Probable	Low	Moderate	Priority 5	A	1
11(c)	Moderate	Probable	Medium	Moderate	Priority 4	A	1
11(d)	Minor	Unlikely	Low	Moderate	Priority 5	A	1
12. Review of AMS						**B**	**2**
12(a)	Moderate	Probable	Low	Moderate	Priority 5	B	2
12(b)	Minor	Probable	Low	Moderate	Priority 5	B	2

4 Detailed findings, recommendations and action plans

Summary of generation works subject to review

Verve Energy's asset portfolio

Verve Energy operates in the competitive West Australian wholesale electricity market (WEM).

A key component of Verve Energy's asset management philosophy is to achieve an effective balance between its short term operational requirements and the need to maintain the long term performance, availability and reliability of its portfolio of assets. Where commercially and technically feasible, Verve Energy undertakes plant enhancements to its portfolio of assets in order to increase capacity revenue returns to the business as well as meet its obligations relating to compliance with:

- Independent Market Operator's (IMO) Market Rules
- All relevant safety, environmental and legal requirements
- Capacity requirements as directed by the Minister for Energy
- West Australian Government's efficiency dividend obligations.

Verve Energy's portfolio approach enables the management of planned outages from a whole of portfolio perspective, within the boundaries of asset specific capacity requirements.

This review specifically considered Verve Energy's power stations at Muja and Kwinana, plus the GTSO Branch, with a focus on understanding the relevant installations, their function and normal modes of operation, their age and an assessment of the installation against the AMS review criteria.

Muja

Key details and a brief chronology[3] of key events relating to Verve Energy's Muja operations are as follows:

- Muja CD Power Station accounts for approximately 30% of Verve Energy's generation capacity
- Stage C consists of two 200 MW units that were uprated (sent-out rating at 41 degrees Celsius) individually in 2010 and 2012 to 210 MW and 205 MW units respectively following a turbine reblade and cylinder replacement. The current forecast retirement year for these units is 2025
- Stage D consists of two 200 MW units that were uprated to 227 MW in 2007 following replacement of LP turbine blades and HP feed-heaters and installation of new HP and IP turbine modules and additional cooling tower cells. The current forecast retirement year for these units is 2030
- Stages A & B, with four 60 MW units, were retired as per the retirement plan in 2007, after which:
    - Various options were considered for use of site, including demolition and redevelopment, resulting in the Inalco proposal being selected after a competitive process in May 2008

[3] Some of which precede the review period but are included for context

  - In June 2008, there was the Varanus Island incident, when WA's domestic gas supply was cut by 30%, which also impacted on electricity capacity
  - The high demand for energy supply at that time prompted a State Government decision to seek alternative means for meeting capacity requirements
  - On direction from the State Government, Verve Energy temporarily returned Muja Units 3 and 4 to service to provide additional capacity in light of the restrictions caused by the Varanus Island incident
  - Approval to proceed with the unit refurbishment project with the intent to return to service was granted by the Minister for Energy in July 2010 and the Vinalco[4] JV was formed the following month
  - In July 2012, there was a boiler tube failure in the lower part of Unit 3 during operational trials. External corrosion to tubes blew steam outwards[5]
  - The result of this boiler incident was the replacement of substantial sections of each boiler to address safety, environmental and operational risks on all four boilers. Commissioning works and tests continued for some time
  - Verve Energy is contracted to operate and maintain those units, using its standard asset management tools and procedures
  - Units 3 and 4 were eventually commissioned to commence commercial operations on 1 April 2013 and 19 February 2013 respectively, while works on units 1 and 2 continued
  - The future of Muja Units 1 and 2 is presently uncertain – see the section "Events since the end of the review period" in the Executive Summary for context

- Since limited operational activity has occurred during the period subject to this review, the extent of this review's consideration of the Muja AB assets was primarily limited to the asset planning, asset creation, maintenance, risk management and contingency planning functions.

In the 2011 Annual Wholesale Electricity Market Report to the Minister, the Authority noted the high planned outage rate for the Muja G7 unit for the 2010/11 capacity year. We note that the planned outage rates for the Muja G7 unit for the 2009/10 and 2011/12 capacity years were significantly lower than for the 2010/11 capacity year, reducing the average planned outage rate for the three capacity years.

Although Muja's asset planning group uses the operating philosophy of a baseload plant for scheduling all operation and maintenance activities, its current mode of operation is 2-Shift with the intent to returning the plant to baseload operation within the next five years. This transition in operating philosophy has been managed by Verve Energy through its tri-annual reliability risk reviews, condition monitoring and bench-marking the plant operation and maintenance risk profiles using RWE nPower[6] processes.

Kwinana

Key details relating to Verve Energy's Kwinana operations are:

- Stage A was retired in late 2011 and is currently in preservation stage on a care & maintenance basis
- The Stage B boilers were demolished and replaced by two new High Efficiency Gas Turbines in 2009 (refer to Gas Turbines section below)

[4] Vinalco was a separate (and ring-fenced) commercial entity, owned 50% Verve Energy and 50% Inalco, formed as a JV after a proposal in 2008 to put Muja AB back into operation. Inalco is ultimately owned by the Kempe Group. Approval to proceed with the project was granted by the Minister for Energy in July 2010 and the JV formed the following month

[5] Internal steam incidents in boilers are quite common, but the external escape of steam is a most unusual occurrence, which immediately led to significant incident response activity on the part of Verve Energy and other parties

[6] A leading integrated UK energy company engaged to assist with the risk review process

- Stage C was commissioned in 1970 as a 2 by 200 MW oil fired plant, with direct seawater cooling. Coal firing capability was added and, later, gas firing as well. The plant has a capacity to achieve 112 MW on coal alone and full rating with either oil or gas in co-firing or standalone fuel mode. Coal is sourced from open cast mines in the Collie Valley by rail. The plant's ability to reliably burn coal is an important feature of its design.
- Stage C plant is expected to play a mid-merit role until its retirement date set in 2015.

In the 2011 Annual Wholesale Electricity Market Report to the Minister, the Authority noted the high planned outage rate for Kwinana G5 and G6 units for the 2010/11 capacity year. We note that the planned outage rates for the Kwinana G5 and G6 units for the 2009/10 and 2011/12 capacity years were significantly lower than for the 2010/11 capacity year, reducing the average planned outage rate for the three capacity years.

Gas Turbines and Sustainable Operations

Verve Energy's gas turbine assets include 16 industrial frame type gas turbines located in multiple locations around the State. The plants' operating regimes vary depending on their operating efficiency and proximity to gas supply pipelines and the transmission network.

The Pinjar Gas Turbine power station consists of nine open cycle, heavy duty gas turbines with a total capacity of 584MW. Commissioned between 1990 and 1996, the plant is located on a remote site within the Gnangara State Forest north of Perth.

The recently commissioned Kwinana High Efficiency Gas Turbines (HEGTs) are aero derivative type open cycle gas turbines that are designed to accommodate frequent starts, stops and load changes with minimal maintenance costs. These machines were procured as a better fit for the system support role that Verve Energy continues to provide in the WEM.

Verve Energy's renewable portfolio consists of 67 on and off-grid wind turbines with a total rated capacity of 101MW and did own 50% through a joint venture of a solar farm with a total rated capacity of 10MW, although that asset is no longer included on the Verve Energy License.

In addition, Verve Energy has a suite of off-grid renewable assets that are connected to stand alone diesel and gas power stations, including Esperance Nine Mile Beach Wind Farm, Hopetoun Wind Farm and Coral Bay Wind Farm.

Typically, the plants provide peak load capacity and a system support service.

Verve Energy has considered the need to:

- Revise the Gas Turbine Life Management strategy and undertake the Optimum Maintenance Spend Plan (OMSP) process to identify key investment works and then prioritise the works accordingly, to better align risk profiles with the current Portfolio Mission Statement
- Review the spare parts register to manage the revised risk profiles and give due consideration to maintaining a Frame 6B gas turbine rotor, considering the age of the units at Pinjar.

Verve Energy has also made considerable efforts in extending the risk identification process to include the Balance of Plant assets in addition to the power generation assets and in establishing processes and procedures to implement regular inspection, testing and maintenance regimes on site specific balance of plant assets.

In the 2011 Annual Wholesale Electricity Market Report to the Minister, the Authority noted the high planned outage rate for the Pinjar GT11 unit for the 2010/11 capacity year. We note that the planned outage rates for the Pinjar GT11 unit for the 2009/10 and 2011/12 capacity years were significantly lower than for the 2010/11 capacity year, reducing the average planned outage rate for the three capacity years.

The following tables contain:

- **Findings**: the reviewer's understanding of the process and any issues that have been identified during the review
- **Recommendations**: recommendations for improvement or enhancement of the process or control
- **Action plans**: Verve Energy's formal response to review recommendations, providing details of action to be implemented to address the specific issue raised by the review.

Asset planning

Key process: Asset planning strategies are focused on meeting customer needs in the most effective and efficient manner (delivering the right service at the right price).

Expected outcome: Integration of asset strategies into operational or business plans will establish a framework for existing and new assets to be effectively utilised and their service potential optimised.

<table>
<tr><th>No</th><th>Effectiveness criteria</th><th colspan="2">Findings</th></tr>
<tr><td>1(a)</td><td>Planning process and objectives reflect the needs of all stakeholders and is integrated with business planning</td><td colspan="2">Through discussions with the Manager Commercial and consideration of Verve Energy’s planning processes, we determined that:
Asset planning is based on a demand forecast model. The process includes input from all stakeholders involved, including:
The Independent Market Operator – providing demand and availability requirements
Verve Energy’s Trading & Fuel business unit – providing fuel assumptions for input into the modelling process
Verve Energy’s Operations business unit – providing relevant information from life cycle plans
Market intelligence
State and Federal Government s – e.g. providing imposed targets on energy sourced from renewable sources
An operation-simulation model called PowrSym is used for forecasting and planning
Strategic planning is performed at the portfolio level with a five year horizon as part of the State Budget Forecast process
The plan is developed and communicated to individual assets to facilitate operational planning
An operational plan is developed for each asset by site analysts.
Examination of the asset management system process mapping indicates that the operational plan is aligned to Verve Energy’s vision and mission and corporate business objectives.</td></tr>
<tr><td></td><td></td><td>Adequacy Rating: Adequately defined (A)</td><td>Performance Rating: Performing effectively (1)</td></tr>
</table>

No	Effectiveness criteria	Findings	

1(b)	Service levels are defined	Through discussions with the Manager Commercial and an examination of the five year plans prepared by Verve Energy, we determined that:
		• The plans provide considerable detail for the planning aspects of the respective assets as per Verve Energy's operational requirements
		• Service levels are determined by the Operations business unit on the basis of:
		  ▪ Relevant operational information from each asset
		  ▪ Actual data on plant output and condition
		• Email tracks are maintained to keep track of any changes in service levels
		• Asset strategies for each of Verve Energy's assets are also designed to specify the required service levels of the respective power station assets.	

		Adequacy Rating: Adequately defined (A)	**Performance Rating:** Performing effectively (1)
1(c)	Non-asset options (e.g. demand management) are considered	Through discussion with the Manager Commercial and consideration of Verve Energy's planning processes, we determined that: • There is a formal requirement for non-asset options to be considered when purchasing assets • Due consideration is given to non-asset options by Verve Energy. Specifically, business trading opportunities are considered, including arrangements with Independent Power Producers (**IPP**) on the SWIS • Verve Energy's approval process for instigating new projects includes a number of considerations that include asset alternatives and non-asset options.	
		Adequacy Rating: Adequately defined (A)	**Performance Rating:** Performing effectively (1)
1(d)	Lifecycle costs of owning and operating assets are assessed	Through discussions with the Manager Commercial and consideration of Verve Energy's planning processes, we determined that Verve Energy has the following process in place to assess lifecycle costs of owning and operating assets during the asset planning phase: • Assessments of lifecycle costs of owning and operating assets are undertaken by the Operations business unit using the Plant Life Utilisation System (PLUS) methodology that identifies, predicts and ranks plant condition, degradation and residual life, and provides an indication of the optimum spending program • PLUS assessment is supported by the OMSP maintenance optimisation decision support system, which is a mathematical modelling tool to analyse and optimise expenditure by evaluating the interaction between plant condition, maintenance spending, investment spending, operating regime and reliability targets • Project evaluations are conducted with both engineering and finance personnel input and with evaluation results detailed and approved by relevant personnel to ensure all engineering, finance, environmental, health and safety aspects are addressed • Relevant economic measures are taken into account within project evaluations.	

No	Effectiveness criteria	Findings	
		Adequacy Rating: Adequately defined (A)	**Performance Rating:** Performing effectively (1)

1(e)	Funding options are evaluated	Through discussions with the Manager Commercial and consideration of Verve Energy's asset planning processes, we determined that:
		• Verve Energy's evaluation of funding options considers a number of key inputs, such as:
		  o Availability of government debt
		  o Government policy
		  o Suitability of finance
		• Project evaluations also require the sources of funds to be considered and outlined for approval
		We noted that during the review period, after considering other funding options Verve Energy elected to:
		• Acquire High Efficiency Gas Turbines (HEGTs) by utilising an equity injection from the State Government
		• Establish a joint venture arrangement for refurbishing Muja A and B units, through the separate (and ring-fenced) commercial entity, Vinalco.	

		Adequacy Rating: Adequately defined (A)	**Performance Rating:** Performing effectively (1)
1(f)	Costs are justified and cost drivers identified	Through discussions with the Manager Commercial and consideration of Verve Energy's asset planning processes, we determined that approval process for new assets requires the costs and cost drivers (in the form of a business case) to be identified and considered.	
		Adequacy Rating: Adequately defined (A)	**Performance Rating:** Performing effectively (1)

No	Effectiveness criteria	Findings	
1(g)	Likelihood and consequences of asset failure are predicted	Through discussion with the Manager Portfolio Development & Optimisation , Operations Business Unit and consideration of Verve Energy's processes and review of relevant supporting documentation, we observed that Verve Energy has applied the following mechanisms for predicting the likelihood and consequence of asset failure: • An engineering risk evaluation tool called ERAP (Engineering Risk Assessment Process) implemented by specialist experts to help quantify risks in terms of likelihood and impact on safety, commercial and environment performance. The tool calculates the risks associated with possible unplanned events, specifically predicting the likelihood and consequences of asset failure • A plant life usage decision support system called PLUS (Plant Life Utilisation System) that identifies, predicts and ranks plant condition, degradation and residual life, and provides an indication of the optimum spending program • The maintenance optimisation decision support system OMSP, which is a mathematical modelling tool to analyse and optimise expenditure by evaluating the interaction between plant condition, maintenance spending, investment spending, operating regime and reliability targets • ERAP and PLUS/OMSP programs are carried out every 4 years. In the interim years, annual reviews of assets are conducted • Independent expert reviews on management and maintenance of Verve Energy's generation assets are also undertaken in conjunction with the four yearly ERAP and PLUS/OMSP programs. We noted that the ERAP, PLUS and OMSP processes are licensed from RWE nPower, a leading integrated UK energy company. Those processes have been implemented by similar companies in South Africa and Canada. Through an examination of a sample of life assessment reports and annual reviews for Muja C&D, Kwinana and Pinjar power stations/units and a May 2013 independent expert's report on a review of generating facilities operated by Verve Energy, we determined that: • The ERAP, PLUS and OMSP processes appear to have been fully and consistently applied to those power stations, facilitating the prediction of the likelihood and consequence of asset failure • Verve Energy's management of planned outages at each of Muja G7, Kwinana G5 & G6 and Pinjar GT11 appears to have been undertaken with due regard to the consequence and likelihood of asset failure at those installations • The management structures, skills and resources assigned to the ERAP, PLUS and OMSP processes appear to be appropriate.	
		Adequacy Rating: Adequately defined (A)	**Performance Rating:** Performing effectively (1)
1(h)	Plans are regularly reviewed and updated	Through discussions with the Manager Commercial consideration of Verve Energy's asset planning processes, we determined that: • Portfolio level plans are prepared on an annual basis, including a rolling five year forecast • The plans are constantly reviewed, at least on a weekly basis • Portfolio road maps are being formalised to refine decision making processes and provide enhanced input to operations staff.	
		Adequacy Rating: Adequately defined (A)	**Performance Rating:** Performing effectively (1)

Asset creation and acquisition

Key process: Asset creation/acquisition means the provision or improvement of an asset where the outlay can be expected to provide benefits beyond the year of outlay.

Expected outcome: A more economic, efficient and cost-effective asset acquisition framework which will reduce demand for new assets, lower service costs and improve service delivery.

<table>
<tr><th>No</th><th>Effectiveness Criteria</th><th colspan="2">Findings</th></tr>
<tr><td rowspan="2">2(a)</td><td rowspan="2">Full project evaluations are undertaken for new assets, including comparative assessment of non-asset solutions</td><td colspan="2">As documented at Asset Planning s.1(c) above, as part of State Government approval process requirements, Verve Energy has developed expenditure approval procedures, which outline the requirement for project evaluations to be undertaken prior to seeking government approval. As part of the project evaluation process, Verve Energy requires the following to be completed:
• A full business case, which outlines the considerations for instigating new projects including environmental considerations, asset alternatives, the approval requirements, financial and capital requirements, current state assessment and timeline
• Standard economic evaluation modelling in support of the business case. The modelling utilises a standard set of high level economic assumptions (updated on a quarterly basis)
• Consideration of non-asset options.</td></tr>
<tr><td>Adequacy Rating: Adequately defined (A)</td><td>Performance Rating: Performing effectively (1)</td></tr>
<tr><td rowspan="2">2(b)</td><td rowspan="2">Evaluations include all life-cycle costs</td><td colspan="2">As documented at Asset Planning s.1(d) above, through discussions with the Manager Portfolio Development & Optimisation and an examination of the Expenditure Approval Policy and Procedure and associated forms and templates, we determined that Verve Energy has the following process in place to assess lifecycle costs of owning and operating assets:
• Assessments of lifecycle costs of owning and operating assets are undertaken using the PLUS methodology that identifies, predicts and ranks plant condition, degradation and residual life, and provides an indication of the optimum spending program template
• A mathematical modeling tool called OMSP is used to analyse and optimise expenditure by evaluating the interaction between plant condition, maintenance spending, investment spending, operating regime and reliability targets
• Project evaluations provide for estimates of the amount of investment required as well as identifying the source of funds.</td></tr>
<tr><td>Adequacy Rating: Adequately defined (A)</td><td>Performance Rating: Performing effectively (1)</td></tr>
</table>

<table>
<tr><th>No</th><th>Effectiveness Criteria</th><th colspan="2">Findings</th></tr>
<tr><td rowspan="2">2(c)</td><td rowspan="2">Projects reflect sound engineering and business decisions</td><td colspan="2">As documented at Asset Planning s.1(d) above, through discussions with the Manager Commercial and Manager Portfolio Development & Optimisation and examination of the Expenditure Approval Policy and Procedure and associated forms and templates, we determined that Verve Energy has procedures in place to assess the commercial and technical competence of projects. Specifically, project evaluations are designed to be:
• Conducted with both engineering and finance personnel input and with evaluation results detailed and approved by relevant personnel to ensure all engineering, finance, environmental, health and safety aspects are addressed
• Managed using project modelling tools whilst taking into account relevant economic measures.
We observed that Verve Energy's Delegated Financial Authority also specifies that any project commitment over $20 million is required to be approved by the Minister.
We also note that Verve Energy is also required to accommodate the requirements of the State Government when evaluating the suitability of asset creation projects.
As an example, in the period to mid-2010, extensive due diligence was undertaken for the entire Vinalco/Muja AB project in relation to the JV arrangements, engineering, legal, accounting, tax and project financing matters. A number of the due diligence reviews included specific analysis of the risks to the project and intended JV partners.
We also note that in July 2010, the Auditor General preliminary review report to the Public Accounts Committee stated:
"Verve could benefit from the JV and I have seen no evidence to suggest this benefit is disproportionate to that of its JV partner. I have also seen no evidence to suggest that the JV arrangements assign a disproportionate share of risk to Verve."</td></tr>
<tr><td>Adequacy Rating: Adequately defined (A)</td><td>Performance Rating: Performing effectively (1)</td></tr>
<tr><td rowspan="2">2(d)</td><td rowspan="2">Commissioning tests are documented and completed</td><td colspan="2">Through discussions with the Manager Commercial and Manager Portfolio Development & Optimisation and review of Verve Energy's documented procedures, we observed that Verve Energy has the following procedures designed to perform commissioning tests:
• Commissioning tests are required for all components added to Verve Energy's asset portfolio
• Full documentation of commissioning tests is required.</td></tr>
<tr><td>Adequacy Rating: Adequately defined (A)</td><td>Performance Rating: Performing effectively (1)</td></tr>
</table>

No	Effectiveness Criteria	Findings	
2(e)	Ongoing legal/environmental/safety obligations of the asset owner are assigned and understood	Through discussions with the Manager Commercial and Manager Portfolio Development & Optimisation, consideration of Verve Energy's policies and procedures and operating systems, we determined that Verve Energy has the following processes in place to manage the legal, environmental and safety obligations specific to each asset: • Environmental and legal considerations are addressed in Verve Energy's project evaluation procedures • Verve Energy's Environmental Team is responsible for comprehensively identifying and managing environmental obligations relevant to its operations. • Verve Energy's safety obligations relevant to its operations are accorded a high priority. We observed that considerable effort is made to address safety issues at the point of employee induction, through specific and ongoing training and formal assignment of responsibilities to supervisory staff. ERAP assessments also specifically consider safety risks in arriving at risk scores • Verve Energy's legal obligations relevant to its operations primarily relate to environmental and safety matters. Other legal obligations are specifically addressed either directly via Verve Energy's in house legal counsel or with the assistance of external legal advisors. An examination of practices employed at selected power stations indicated that: • Verve Energy has commissioned the installation of a Continuous Emissions Monitoring System (CEMS) and associated equipment at the Muja power station. In addition, management of the Muja power station fly ash dam has been improved by reducing the seepage of supernatant water. Environment issues at the Kwinana power station are also being well managed, including monitoring of chlorine content in the cooling water discharge, stack emissions monitoring, oily water discharge monitoring and fly ash supernatant plumes monitoring at Perron Quarry • The most recent (2009) ERAP assessment for each of the Muja Power Station, Kwinana Power Station and Pinjar gas turbine units identified and assessed a number of safety risks specific to operations at those respective sites.	
		Adequacy Rating: Adequately defined (A)	**Performance Rating:** Performing effectively (1)

Asset disposal

Key process: Effective asset disposal frameworks incorporate consideration of alternatives for the disposal of surplus, obsolete, under-performing or unserviceable assets. Alternatives are evaluated in cost-benefit terms.

Expected outcome: Effective management of the disposal process will minimise holdings of surplus and under-performing assets and will lower service costs.

<table>
<tr><th>No</th><th>Effectiveness Criteria</th><th colspan="2">Findings</th></tr>
<tr><td rowspan="2">3(a)</td><td rowspan="2">Underutilised and underperforming assets are identified as part of a regular systematic review process</td><td colspan="2">As documented at Asset Planning s.1(g) above, through discussions with the Manager Portfolio Development & Optimisation and examination of relevant supporting documentation, we observed that Verve Energy has applied the following mechanisms for identifying under-utilised and under-performing assets:
PLUS assessments are conducted every four years to identify, predict and rank plant condition, degradation and residual life, and provide an indication of the optimum spending program
ERAP risk assessments conducted every four years by specialist experts to help quantify asset risks in terms of likelihood and impact
Asset reviews at each site are undertaken on an annual basis
Independent expert reviews are conducted on capital expenditure relating to maintenance of assets
Loss prevention inspections, as a major aspect of Verve Energy’s risk management activities directed at asset operations
Results of these assessments and inspections are included in the rolling five year plans.</td></tr>
<tr><td>Adequacy Rating: Adequately defined (A)</td><td>Performance Rating: Performing effectively (1)</td></tr>
<tr><td rowspan="2">3(b)</td><td rowspan="2">The reasons for under-utilisation or poor performance are critically examined and corrective action or disposal undertaken</td><td colspan="2">Through discussions with the Manager Portfolio Development & Optimisation and examination of relevant supporting documentation, we observed that Verve Energy has applied the mechanisms at Asset Disposal (s.3(a)) to facilitate the examination of under-utilised and under-performing assets by:
Collecting relevant data and information to enable assessment of the root cause of any underutilisation or poor performance of power station assets
Assessments are incorporated into the rolling five year plans which detail the major projects planned for the coming financial year, including any equipment refurbishment, upgrade or replacement
As part of the capital expenditure process, the project evaluation process involves a business case to be presented, which requires details of why the upgrade/purchase of equipment is important to the condition of the asset.</td></tr>
<tr><td>Adequacy Rating: Adequately defined (A)</td><td>Performance Rating: Performing effectively (1)</td></tr>
</table>

No	Effectiveness Criteria	Findings	
3(c)	Disposal alternatives are evaluated	Through discussions with the Manager Portfolio Development & Optimisation and examination of supporting documentation, we determined that Verve Energy's processes require: • The need to address alternatives for decommissioning, removal or storage of key plant • The rolling five year plans to provide details of the major projects planned for each asset in the coming financial year, including any equipment replacement requirements.	
		Adequacy Rating: Adequately defined (A)	**Performance Rating:** Performing effectively (1)
3(d)	There is a replacement strategy for assets	Through discussions with the Manager Portfolio Development & Optimisation we understand that the replacement strategies established for Verve Energy's power station assets are reflected in: • Rolling five year plans established for each asset site, as contained in the Portfolio Asset Mission report • Individual asset business plans. We also note that Verve Energy's replacement strategies consider the replacement of generation capacity at the portfolio level by means of retirement and closure rather than replacement of individual assets.	
		Adequacy Rating: Adequately defined (A)	**Performance Rating:** Performing effectively (1)

Environmental analysis

Key process: Environmental analysis examines the asset system environment and assesses all external factors affecting the asset system.

Expected outcome: The asset management system regularly assesses external opportunities and threats and takes corrective action to maintain performance requirements.

No	Effectiveness Criteria	Findings	
4(a)	Opportunities and threats in the system environment are assessed	Through discussions with the Environmental Manager and examination of applicable procedures, we determined that Verve Energy has developed a risk based management system to identify and assess opportunities and threats to the system environment for its assets. Verve Energy has developed procedures, which: • Apply to all of Verve Energy's assets and operational aspects within those assets • Facilitate the identification and assessment of risks associated with Verve Energy's operations (including power station operations) • Ensure systematic review of environmental aspects and impacts • Align to ISO 14001, Dangerous Goods regulations and health and safety requirements • Outline the method of logging, maintaining and reporting on environmental aspects and associated impacts. Through discussions with the Environmental Manager and consideration of the environmental assessment procedures, we determined that: • A risk register has been developed to identify all activities of its assets and associated risks. The risks are then thoroughly assessed, leading to a focused plan for monitoring circumstances, which is reviewed annually • Risks and incidents are logged onto the Generation Incident Reporting System (GIRS), which are then assessed by the Environmental Team • Incidents logged via the GIRS are reviewed at site meetings for each asset. We also note that Verve Energy has committed to installing a Continuous Emissions Monitoring System (CEMS) and associated equipment at Muja.	
		Adequacy Rating: Adequately defined (A)	**Performance Rating:** Performing effectively (1)

No	Effectiveness Criteria	Findings	
4(b)	Performance standards (availability of service, capacity, continuity, emergency response, etc.) are measured and achieved	Through discussions with the Environmental Manager and the Manager Portfolio Development & Optimisation, we determined that Verve Energy has established the following processes to ensure that performance standards are planned, measured and achieved: • The IMO determines the capacity and plant availability targets, which in turn guide the plans and service levels for each of Verve Energy's assets. The plans provide considerable detail for the planning aspects of the respective assets as per Verve Energy's operational requirements (consistent with Asset Planning 1(b)) • Verve Energy has developed a series of system recovery plans, including black/brown start procedures for each asset, in the event of a major failure of site assets or key systems. System recovery plans are subject to a detailed review when triggered by a major equipment change or reconfiguration, and otherwise subject to high level review through the ERAP process. Where relevant and possible, emergency response plans are subject to testing in accordance with timeframes specified in the relevant plan (consistent with Contingency Planning 9(a)) • Engaging independent specialist consultants to assist in monitoring aspects of Verve Energy's operations, for example assessment of planned maintenance works.	
		Adequacy Rating: Adequately defined (A)	**Performance Rating:** Performing effectively (1)
4(c)	Compliance with statutory and regulatory requirements	Through discussions with the Environmental Manager and the Manager Portfolio Development & Optimisation, regarding Verve Energy's processes to ensure compliance with statutory and regulatory requirements, we determined that Verve Energy: • Has established procedures, which require the periodic evaluation of compliance with relevant environmental legislation and regulations. To facilitate monitoring of regulatory and legislative requirements, Verve Energy has established procedures to capture any updates/changes in their obligations following changes in legislative requirements. These changes are then incorporated into an online compliance register that details all of Verve Energy's compliance obligations, including those relevant to its electricity generation licence, the Act and related legislation • Continues to maintain ISO-14001 standard and as such is required to maintain an effective Environmental Management System (EMS) that monitors all obligations that have an environmental focus. To ensure that Verve Energy is performing appropriately against the legislative requirements, there are different types of audits conducted, including an audit for re-certification in ISO status at regular intervals • Operates and monitors its operations in accordance with various statutory legislation and licences, including the Environmental Protection Act 1986 and its operating environment licenses • Continues to undertake plant improvements to better manage environmental obligations. During the site visit to the Muja CD Power Station, we observed the following plant improvement initiatives: ▪ Improvement in management of the fly ash dam to reduce seepage ▪ Addressing the inability of a component of the asset to adequately perform by returning the asset to its original condition through removing previous modifications and upgrading the electrical components ▪ Undertaking other continual plant improvement projects such as extraction systems, governor system, Control Room upgrade and simulator installation ▪ Commitment to installing a Continuous Emissions Monitoring System (CEMS) and associated equipment.	
		Adequacy Rating: Adequately defined (A)	**Performance Rating:** Performing effectively (1)

No	Effectiveness Criteria	Findings	
4(d)	Achievement of customer service levels	As Verve Energy is a generator of power, it does not have specific customer service levels to attain in relation to its electricity generation operations. In the context of its obligations to the community, Verve Energy operates and monitors its operations in accordance with the statutory legislation and licences detailed at 4(c) above.	
		Adequacy Rating: Adequately defined (A)	**Performance Rating:** Performing effectively (1)

Asset operations

Key process: Operations functions relate to the day-to-day running of assets and directly affect service levels and costs.

Expected outcome: Operations plans adequately document the processes and knowledge of staff in the operation of assets so that service levels can be consistently achieved.

<table>
<tr><th>No</th><th>Effectiveness Criteria</th><th colspan="2">Findings</th></tr>
<tr><td>5(a)</td><td>Operational policies and procedures are documented and linked to service levels required</td><td colspan="2">Through discussions with the Manager Portfolio Development & Optimisation, Station Managers for Muja and Kwinana power stations, plus key managers of Gas Turbine operations; and examination of documented policies, procedures and protocols, we observed that Verve Energy has:
Comprehensively documented policies, procedures and protocols for each of its asset sites designed to facilitate the effective operation of its assets. All asset related policies, procedures and protocols are documented within the Verve Energy's Document Management System (DMS)
Developed procedures which specifically refer to required service levels (where appropriate) for the operation of the specific item of equipment, or specific electrical or mechanical procedures
Developed plant operating instructions and control plans for major items of plant, such as boilers, generators and condensers for each asset.
DMS is used to track whether all operators have read the plant operating instructions following any plant modifications.</td></tr>
<tr><td></td><td></td><td>Adequacy Rating: Adequately defined (A)</td><td>Performance Rating: Performing effectively (1)</td></tr>
<tr><td>5(b)</td><td>Risk management is applied to prioritise operations tasks</td><td colspan="2">Verve Energy applies risk management practices with regards to asset operations. Through discussions with the Manager Portfolio Development & Optimisation and consideration of Verve Energy's risk management practices and operational activities, we determined that Verve Energy's operational methodology is designed to:
Use risk based processes to manage its assets
Manage risks by professional and appropriately qualified personnel adopting good processes and procedures set by the ERAP and PLUS process
Manage its risk profile by investing in plant improvements optimally through its Optimum Maintenance Spend Plan
Embrace critical risk reduction strategies such as improved engineering resources on site and replacing aging electrical components.</td></tr>
<tr><td></td><td></td><td>Adequacy Rating: Adequately defined (A)</td><td>Performance Rating: Performing effectively (1)</td></tr>
</table>

No	Effectiveness Criteria	Findings	
5(c)	Assets are documented in an Asset Register including asset type, location, material, plans of components, an assessment of assets' physical/structural condition and accounting data	Verve Energy manages assets through its modern electronic asset maintenance system, Ellipse. Ellipse contains the following information for major equipment: • Unique asset identification (asset ID) • Equipment details (including type, location, components, operational capacity, age, expected life) • Equipment history, including condition, service history and expenditure on labour and materials • Maintenance procedures • Maintenance intervals.	
		Adequacy Rating: Adequately defined (A)	**Performance Rating:** Performing effectively (1)
5(d)	Operational costs are measured and monitored	Through discussion with the Manager Portfolio Development & Optimisation and examination of Verve Energy's reporting processes, we determined that: • Dashboard reports are produced on a monthly basis for each asset, enabling the management to specifically assess actual v budgeted expenditure for each asset, identify sites that are over budget or problematic and determine necessary corrective action • Verve Energy's reporting processes compare actual performance against budgeted expenditure for each asset site. Reasons for significant variances at the cost centre level are examined and scrutinised by Verve Energy's management.	
		Adequacy Rating: Adequately defined (A)	**Performance Rating:** Performing effectively (1)

<table>
<tr><th>No</th><th>Effectiveness Criteria</th><th colspan="2">Findings</th></tr>
<tr><td>5(e)</td><td>Staff receive training commensurate with their responsibilities</td><td colspan="2">Verve Energy has established training programs to ensure its plant operators are fully trained in all key aspects of asset operations (relevant to each individual's position). Through discussion with the Manager Portfolio Development & Optimisation, Station Managers for Muja CD and Kwinana power stations, plus key managers of Gas Turbine operations; and examination of Verve Energy's staff related processes, we determined that:
Verve Energy's staff appear to have a clear understanding of the asset management processes within their area of responsibility and are consistent in their reference to relevant corporate information and strategy
For each asset site, Verve Energy has a well established organisation chart with clearly defined roles and responsibilities linked with appropriate qualifications and training of personnel
The management team have a detailed succession plan in place with known retirements for the next five years covering all disciplines including operations
Operation trainees are trade based and /or are sourced from other power industries
We observed the use of staff training registers maintained by station managers to keep training of all staff up-to-date and relevant to their responsibilities.
In relation to the Kwinana power station, we observed that the extent of operator access to the Plant DCS system (as identified through the 2009 ERAP assessment) creates a minor exposure to operational errors and potential accidents. The current operator access levels allow operators to potentially alter parameters in protection systems, alarm limits and bypass permissives. We assessed that a more focussed operator training and review procedures can help minimise this risk.
Adequacy Rating: Requires some improvement (B) | Performance Rating: Opportunity for improvement (2)</td></tr>
<tr><td></td><td colspan="2">Recommendation 1/2013
Verve Energy:
(a) Review the extent of operator access to the Kwinana Power Station Plant DCS system, with the objective of further minimising the risk of operational errors and potential accidents
(b) Where appropriate, implement:
Focussed operator training
Review procedures, including the requirement for least two operators to sign off on changes in DCS procedures.</td><td>Action Plan 1/2013
Verve Energy will:
1. Provide evidence of its review of the extent of operator access to the Kwinana Power Station Plant DCS system, with the objective of further minimising the risk of operational errors and potential accidents;
2. Where appropriate, implement focused operator training regarding the Kwinana Power Station Plant DCS system; and
3. Provide evidence of its review of procedures regarding the Kwinana Power Station Plant DCS system, including whether or not there should be a requirement for at least two operators to sign off on changes in DCS procedures.

Responsible Person: Manager Portfolio Development & Optimisation
Target Date: December 2013</td></tr>
</table>

Asset maintenance

Key process: Maintenance functions relate to the upkeep of assets and directly affect service levels and costs.

Expected outcome: Maintenance plans cover the scheduling and resourcing of the maintenance tasks so that work can be done on time and on cost.

<table>
<tr><th>No</th><th>Effectiveness Criteria</th><th colspan="2">Findings</th></tr>
<tr><td rowspan="2">6(a)</td><td rowspan="2">Maintenance policies and procedures are documented and linked to service levels required</td><td colspan="2">Through discussions with the Manager Portfolio Development & Optimisation and examination of documented policies, procedures and protocols, we observed that Verve Energy has:
Comprehensively documented policies, procedures and protocols for each of its asset sites designed to facilitate maintenance of Verve Energy’s assets
Documented asset related maintenance policies, procedures and protocols within its Ellipse information support system. Ellipse incorporates major equipment maintenance procedures, equipment details, maintenance intervals, costs and equipment history
Developed procedures which specifically refer to required service levels (where appropriate) for the operation of the specific item of equipment, or specific electrical or mechanical procedures.
During our site visits to Muja CD and Kwinana power stations and the GTSO Branch Kewdale office, we observed that maintenance processes and procedures are well established and complimented by continual plant improvements being undertaken.</td></tr>
<tr><td>Adequacy Rating: Adequately defined (A)</td><td>Performance Rating: Performing effectively (1)</td></tr>
</table>

No	Effectiveness Criteria	Findings	
6(b)	Regular inspections are undertaken of asset performance and condition	Through discussion with Manager Portfolio Development & Optimisation, examination of written procedures and reports and site visits to Muja CD and Kwinana power stations and the GTSO Branch Kewdale office, we observed that: • A structured program is in place for key mechanical and electrical assets (such as turbines, feedwater pumps, transformers, generators, switchgear) to be condition monitored using online vibration, remote monitoring and acoustic detection monitoring devices • Earthing systems and protection relays are regularly tested (including partial discharge) to avoid unplanned outages or failures • Condition monitoring of plant assets, control system upgrade continue to provide crucial assistance to Verve Energy with its outage planning works • Equipment assessment and inspection reports are generated and made available to staff and management requiring information on equipment condition and performance. We examined a sample of inspection reports performed, which indicate that the above maintenance processes are operational. **Improvement opportunity** We also noted that a significant amount of forward planning for Kwinana Power Station assets had been affected by the uncertainty surrounding the plant closure/retirement date, which has only been clarified by a government decision in late June 2013 to retire the plant in 2015. A confirmed retirement date was critical for the optimum management of asset life to be aligned with the retirement date and for a thorough Optimum Maintenance Spend Plan to be produced. The 2009 Engineering Risk Assessment Process assessment confirmed the planned critical risk reduction strategies such as improved engineering resources on site, replacing aging electrical components, etc. Although the extent of the improvement works undertaken to improve the condition of the plant is constrained by the official plant closure date of 2015, Verve Energy is expected to continue to manage the safety critical risks of thermal fatigue and corrosion type issues. Effective options for managing those risks are to implement Acoustic Leak Detection Systems and to minimise the 2-shifting operations of the plant. As other planned risk reduction works are ongoing the next ERAP assessment should clarify the residual risk profile of the plant.	
		Adequacy Rating: Adequately defined (A)	**Performance Rating:** Opportunity for improvement (2)

No	Effectiveness Criteria	Findings
	Recommendation 2/2013 In order to most effectively control thermal fatigue issues in Kwinana Power Station assets, Verve Energy consider: (a) Minimising two shift operations (b) Installing an acoustic leak detection system.	**Action Plan 2/2013** Verve Energy notes the June 2013 State Government decision to retire Kwinana Power Station Stage C from October 2015. Within this context Verve Energy will consider what options to most effectively control thermal fatigue issues in Kwinana Power Station assets are appropriate for the remainder of its life. This review will include consideration of the appropriateness of: • Minimising two shift operations; and • Installing an acoustic leak detection system. **Responsible Person:** Manager Portfolio Development & Optimisation **Target Date:** December 2013

No	Effectiveness Criteria	Findings
6(c)	Maintenance plans (emergency, corrective and preventative) are documented and completed on schedule	Through discussion with Manager Portfolio Development & Optimisation, Power Station Managers, Operations staff and examination of Verve Energy's Ellipse system records, we observed that Verve Energy's maintenance planning function requires: • For each facilities' major equipment, Ellipse to contain plans for scheduled maintenance as well as required emergency and corrective works • Emergency and corrective works to have the highest priority due to the impact on plant availability • All maintenance work undertaken to be recorded in Ellipse • Maintenance schedules to be monitored. In relation to planned outages at those units with high outage rates in the 2011 capacity year, we noted that: • For Muja G7, in the three capacity years to 30 September 2012, there were 29.9 outage weeks of which 28.9 weeks were planned. In the period 1 October 2012 to 31 March 2013, there were 2.1 outage weeks of which 1.3 weeks were planned for general maintenance, and no outages have been planned the remainder of the capacity year to 30 September 2013 • For Kwinana G5, in the three capacity years to 30 September 2012, there were 59 outage weeks of which 58.7 weeks were planned. In particular, between April and August 2011, Kwinana Unit G5 was taken out of service for 20 weeks for a number of major works including a mid-life condition assessment of high pressure high temperature parts as required by the Occupational Health and Safety Regulations 1996. In the period 1 October 2012 to 31 March 2013, there were no planned outages, and in the remainder of the capacity year to 30 September 2013 14.5 weeks outage are planned • For Kwinana G6, in the three capacity years to 30 September 2012, there were 69.4 outage weeks of which 69.1 weeks were planned giving an average planned outage rate of 44 percent. Between June 2010 and December 2011, an outage of 49 weeks related to a maintenance requirement for replacing a cracked high pressure turbine casing. The decision to replace the cylinder was made after a study of the condition of the turbine and an assessment of the risk of continuing to operate the turbine in that condition. In the period 1 October 2012 to 31 March 2013, there were 3.4 weeks of planned outages and in the remainder of the capacity year to 30 September 2013 no outages are planned • For Pinjar GT11, there was an outage lasting 28 weeks from June 2011. During this period, a new turbine motor was installed and underwent subsequent repairs. The unit returned to service in December 2011 and has operated without incident since. The unit is expected to operate with high availability into the future. In the absence of the repairs, it is highly likely that the machine would have become completely inoperable. In relation to those major planned outages, we also observed that: • In each case, to reduce the duration of the outages, Verve Energy arranged work on critical path activities to be conducted 24 hours/day • All of the planned work undertaken appears to have performed on genuine technical and safety grounds that were adequately challenged and documented • Verve Energy's procedure for approval of expenditure requires an adequate level of analysis and scrutiny of business cases against corporate performance criteria, to allow a reasonable level of transparency ommendations.

<table>
<tr><th>No</th><th>Effectiveness Criteria</th><th colspan="2">Findings</th></tr>
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Projects appear to have been delivered on schedule and the benefits promised appear to have been delivered
Every outage is concluded with an Outage Report and a detailed MetLab report which form the basis for the Outage Review meeting that lead to new work orders being raised. A typical MetLab report was shown during the audit visit.

During our site visits to Muja CD and Kwinana power stations and the GTSO Branch Kewdale office, we observed that incidents are logged in the Generation Incident Reporting System, which then lead to new work orders and into future outage planning.
Improvement opportunity
We noted that in instances where recommendations are made by the detailed MetLab reports prepared as part of outage reporting, Verve Energy’s processes provide for work orders to be raised to address those recommendations.
As those processes do not provide a procedural link between the relevant recommendations and completed work orders, there is a minor improvement opportunity to more effectively track action taken to close out those recommendations.
</td></tr>
<tr><td></td><td></td><td>Adequacy Rating: Adequately defined (A)</td><td>Performance Rating: Opportunity for improvement (2)</td></tr>
<tr><td></td><td colspan="2">Recommendation 3/2013
Verve Energy implement a procedure to facilitate tracking of progress on recommendations in the outage closeout report by linking those recommendations with the consequent work orders raised.</td><td>Action Plan 3/2013
Verve Energy will develop and implement a procedure to facilitate tracking of progress on recommendations in the outage closeout report by linking those recommendations with the consequent work orders raised.

Responsible Person: Manager Portfolio Development & Optimisation
Target Date: December 2013</td></tr>
</table>

No	Effectiveness Criteria	Findings	
6(d)	Failures (including the significance of the failure) are analysed and operational/maintenance plans adjusted where necessary	Through discussion with Operations staff and walkthrough of Verve Energy's asset operations and maintenance procedures, we observed that those procedures provide for: • Equipment failures to be investigated and where necessary, associated systems to be modified or corrected to reduce the likelihood of the failure to be repeated • The significance of the failure is a major consideration in the investigation and resulting modifications. In our examination of a sample of outages and failures, we observed that: • At Kwinana G6, over half of the lost availability during the review period was incurred as a result of the turbine failure and the original decision to replace the cylinder was made after a study of the condition of the turbine and an assessment of the risk of continuing to operate the turbine in that condition. This decision appears to have been made with due consideration to all relevant factors, including safety, environmental and commercial obligations • A mid-life condition assessment of high pressure high temperature parts was required to be conducted at Kwinana G5 during a planned outage between April and August 2011, as required by the Occupational Health and Safety Regulations 1996. The inspections involved removal of asbestos insulation, which was required to be carried out in accordance with the requirements of the Occupational Health and Safety Regulations 1996 for following the Code of Practice for the Safe Removal of Asbestos. The asbestos removal activities were on the project critical path and other work could not be conducted where removal was taking place and until the area had been declared as safe to work in. As a positive outcome of the analysis and adjustments to maintenance plan, information was gathered that will enable a more accurate prediction of the viable operating life of critical components and close monitoring, where necessary. • Future planned outages are expected to manage refurbishing of aging switchgear to minimise failures and forced outages for optimally managing plant life cycle, reliability and plant performance. In relation to the Muja AB boiler incident, we observed that there had been considerable analysis of safety, environmental and operational risks, resulting in substantial works and tests before units were put back into operation.	
		Adequacy Rating: Adequately defined (A)	**Performance Rating:** Performing effectively (1)

No	Effectiveness Criteria	Findings	
6(e)	Risk management is applied to prioritise maintenance tasks	Verve Energy applies risk management practices with regards to asset operations. Through discussions with the Manager Portfolio Development & Optimisation and consideration of Verve Energy's risk management practices and operational activities, we determined that Verve Energy's maintenance methodology is designed to: • Use risk based processes to manage its power station assets • Manage risks by professional and appropriately qualified personnel adopting good processes and procedures set by its ERAP and PLUS process • Manage its risk profile by investing in plant improvements optimally through its Optimum Maintenance Spend Plan • Embrace critical risk reduction strategies such as improved engineering resources on site and replacing aging electrical components. We noted that the maintenance tasks scheduled during planned outages for Muja G7, Kwinana G5 and G6 and Pinjar GT11 were subjected to business and risk analysis, as was the boiler tube incident at Muja AB. We understand that Verve Energy expects Kwinana G5 and G6 to require less outage time over the coming years based on extensive work done in assessing risk and prioritising and optimising maintenance spending.	
		Adequacy Rating: Adequately defined (A)	**Performance Rating:** Performing effectively (1)
6(f)	Maintenance costs are measured and monitored	Through discussion with the Manager Portfolio Development & Optimisation, the Power Station Managers and examination of Verve Energy's reporting processes, we determined that: • Dashboard reports are produced on a monthly basis for each asset, enabling management to specifically assess actual v budgeted expenditure for each asset, identify sites that are over budget or problematic and determine necessary corrective action • Verve Energy's reporting processes compare actual performance against budgeted expenditure for each asset site. Reasons for significant variances at the cost centre level are examined and scrutinised by management.	
		Adequacy Rating: Adequately defined (A)	**Performance Rating:** Performing effectively (1)

Asset management information system

Key process: An asset management information system is a combination of processes, data and software that support the asset management functions.

Expected outcome: The asset management information system provides authorised, complete and accurate information for the day-to-date running of the asset management system. The focus of the review is the accuracy of performance information used by the licensee to monitor and report on service standards.

No	Effectiveness Criteria	Findings	
7(a)	Adequate system documentation for users and IT operators	Through discussion with the IT&T Services Manager, Finance & Business Services and consideration of Verve Energy's support arrangement with Ventyx, we observed that: • Technical documentation for Ellipse asset management application systems is managed and maintained by Ventyx • A service level agreement is in place to cover the services provided by Ventyx to Verve Energy • User guides are kept up to date . Documents are stored in the Humming bird DM electronic document management system, which has a tracker for document version control. Drawings management is managed via the TIMS3 system, which maintains audit trails for all drawings.	
		Adequacy Rating: Adequately defined (A)	**Performance Rating:** Performing effectively (1)
7(b)	Input controls include appropriate verification and validation of data entered into the system	Through discussion with the IT&T Services Manager, Finance & Business Services and consideration of Verve Energy's IT control environment, we observed that input controls are: • Implemented via 'global profiles' assigned to each employee based on their roles and position • Determined and governed by Verve Energy and implemented into Ellipse by Ventyx. Processes are in place to verify and validate data entered into Ellipse system. We also observed that limited number of people have access to input data into Ellipse and there is a quality assurance process that requires signoff from relevant staff.	
		Adequacy Rating: Adequately defined (A)	**Performance Rating:** Performing effectively (1)
7(c)	Logical security access controls appears adequate, such as passwords	Through discussions with the IT&T Services Manager, Finance & Business Services and consideration of Verve Energy's IT security policies, we observed that: • Verve Energy's processes and procedures provide for all users to be assigned a unique 'global profile' user account and password that adhere to Verve Energy's security standards. Account password requirements provide for a minimum and mixture of characters • Passwords for Ellipse is synchronised to the Windows environment via the active directory. Three unsuccessful login attempts freezes the user account • Verve Energy's IT Security policy documents the standards, which define how access are granted and permissions are managed.	
		Adequacy Rating: Adequately defined (A)	**Performance Rating:** Performing effectively (1)

No	Effectiveness Criteria	Findings	
7(d)	Physical security access controls appear adequate	Through discussions with the IT&T Services Manager, Finance & Business Services and consideration of Verve Energy's security policies, we observed that: • Physical access to the data centre is restricted and logged through the use of swipe cards. To access the data centre, an advance notification is required to be logged by all staff • Upon notification of termination of an employee, the global profile is ceased • Access to the data centre is reviewed on a regular basis and is subject to internal and external audits • Contractors are to be accompanied by appropriate IT personnel when entering the data centre. No generic access cards are to be made available. Access granted to contractors includes a specified end date We also noted that Verve Energy has instigated precautions to contain fire and other damaging events in its Data Centre. There are fire extinguishers located within as well as nearby the data centre. Temperature, humidity and flood sensors are also installed and notification is sent to the building facility management if any of the sensors are triggered.	
		Adequacy Rating: Adequately defined (A)	**Performance Rating:** Performing effectively (1)
7(e)	Data backup procedures appear adequate	Through discussions with the IT&T Services Manager, Finance & Business Services and consideration of Verve Energy's backup and recovery procedures, we observed that: • Backups of production data occurs on a daily, weekly, monthly and annual basis. The yearly backup is permanently retained • Backup tapes are collected and stored off-site. • Ellipse is included in the Disaster Recovery solution's annual remedial exercise, which is conducted on an annual basis.	
		Adequacy Rating: Adequately defined (A)	**Performance Rating:** Performing effectively (1)
7(f)	Key computations related to licensee performance reporting are materially accurate	For the purpose of Verve Energy's licence performance reporting to the Authority in accordance with its Licence requirements, Verve Energy does not directly extract data from Ellipse and is not directly reliant on computations from that system.	
		Adequacy Rating: Not rated	**Performance Rating:** Not rated
7(g)	Management reports appear adequate for the licensee to monitor licence obligations	Through discussions with the IT&T Services Manager, Finance & Business Services and consideration of Verve Energy's management reporting procedures, we observed that: • A substantial variety of reports are capable of being generated from Ellipse • Scheduled reports are run on a regular basis including management reports such as the Dashboard.	
		Adequacy Rating: Adequately defined (A)	**Performance Rating:** Performing effectively (1)

Risk management

Key process: Risk management involves the identification of risks and their management within an acceptable level of risk.
Expected outcome: An effective risk management framework is applied to manage risks related to the maintenance of service standards.

No	Effectiveness Criteria	Findings	

8(a)	Risk management policies and procedures exist and are being applied to minimise internal and external risks associated with the asset management system.	Through discussions with the Manager Audit and Risk and consideration of Verve Energy's risk management practices, we observed that:
		• Verve Energy incorporates risk management as a fundamental aspect of its decision making processes to support and enhance business activities in all areas of its operations
		• Verve Energy's risk management hierarchy is composed of:
		  ▪ Enterprise Risk Management activities that focus on corporate accountability and strategic and material risks that affect the organisation (encapsulated in the Corporate Risk Register, which is expected to capture key issues identified through operational risk management activities, including project risk identification, assessment and treatment)
		  ▪ Operational Risk Management activities that focus on functional accountability and localised processes and systems for managing technical risk disciplines such as Health and Safety (including Project Risk Registers)
		• The Board provides oversight on all elements of risk management, with the Audit & Risk Management Committee having accountability for ensuring that risk management processes are established and operating effectively. The Chief Executive Officer has the ultimate ownership responsibility for risk management, with the Executive playing a pivotal role. The Manager Audit & Risk provides guidance on the application of the process and also reports risk management activity to the Board Audit & Risk Management Committee
		• At each site, the ERAP process is implemented to quantify risks in terms of likelihood and impact on safety, commercial and environment performance. The tool calculates the risks associated with possible unplanned events
		• The ERAP tool is supported by the PLUS plant life usage decision support system and the maintenance optimisation decision support system OMSP
		• Risk assessments via ERAP are reviewed every 4 years and in the interim annual reviews are carried out.
		We sighted ERAP assessments prepared for each of the Muja Stage C&D, Kwinana and Pinjar GT power stations.
		While different risk management is applied to operating assets compared to a project to (re)create an operating asset, in relation to the Muja AB asset:
		• An ERAP assessment was not performed in the review period, though one is scheduled for later in 2013
		• The refurbishment project is referenced in two of the top 10 corporate risks
		• The Project Risk Register contained definition of multiple risks, to a much greater level of detail.
		From a project risk perspective, examination of the Muja AB project risk register suggests that there was little update to the risk material between September 2011 and December 2012, other than the boiler tube incident risk assessment.	

		Adequacy Rating: Adequately defined (A)	**Performance Rating:** Opportunity for improvement (2)

No	Effectiveness Criteria	Findings	
8(b)	Risks are documented in a risk register and treatment plans are actioned and monitored	Through discussions with the Manager Audit and Risk and Manager Portfolio Development & Optimisation and an examination of Verve Energy's risk management procedures, we determined that: • The primary tool used by Operations business unit to capture risks related to its assets is the ERAP assessments that calculate and documents risks associated with possible unplanned events • The ERAP process provides a risk management methodology that is implemented by specialist experts to assess and mitigate risks identified in Verve Energy's operating environment. The methodology has been licensed from RWE nPower, a leading integrated UK energy company. We understand the methodology has been successfully implemented by similar companies in South Africa and Canada • In addition to the ERAP assessments, detailed annual reviews are conducted to quantify the risks associated with possible unplanned events. Risk mitigation plans are developed and primarily actioned through work orders, schedules and tasks generated in the Engineering Request System. Those actions are monitored through day to day operations • The recommendation summaries from ERAP assessments are compiled to represent a live risk register for each site, with the recommendation assigned to a responsible person with the status expected to be reviewed frequently • The live risk register also documents and addresses risks relating to environment health and safety concerns of the asset operations. There is no question that many risks in relation to Muja AB were documented in the appropriate risk registers and that these individual risk treatment plans were actioned and closely monitored. It is questionable whether the full implications of the risk of the Muja AB refurbishment project were sufficiently appreciated quickly enough and actioned.	
		Adequacy Rating: Adequately defined (A)	**Performance Rating:** Opportunity for improvement (2)
8(c)	The probability and consequences of asset failure are regularly assessed.	Through our discussions with the Manager Audit and Risk and Manager Portfolio Development & Optimisation and an examination of Verve Energy's risk management procedures, we observed that Verve Energy has applied the following mechanisms for identifying consequence and likelihood of power station asset failure (as per Asset Planning s.1(g)): • ERAP risk assessments supported by PLUS and OMSP tools are conducted for each power station unit at four year intervals and in the interim, detailed annual reviews are conducted to quantify the risks associated with possible unplanned events • Independent expert reviews on management and maintenance of Verve Energy's generation assets are also undertaken in conjunction with the four yearly ERAP and PLUS/OMSP programs • Risk based inspections are performed on a routine basis by power station personnel, as part of day-to-day operational and maintenance activity specific to each facility. In relation to the Muja AB asset, by September 2011, the Muja AB Project Risk Register had further refined the number and assessment of relevant risks. We question the appropriateness of the likelihood rating applied to the project completion delay risk, in light of widespread delays and cost overruns for such projects in Western Australia at that time. Apart from the boiler incident, there was little evidence of review for the next year and no annual review at or before September 2012. As an indication of the level of priority accorded by Verve Energy to asset failure, we observed that standard operating procedures have been established to deal with unplanned outages caused by major plant failure. The recent disturbance event on 6 March 2013 demonstrates the readiness of Verve Energy in dealing with asset failure.	
		Adequacy Rating: Adequately defined (A)	**Performance Rating:** Opportunity for improvement (2)

Contingency planning

Key process: Contingency plans document the steps to deal with the unexpected failure of an asset.

Expected outcome: Contingency plans have been developed and tested to minimise any significant disruptions to service standards.

No	Effectiveness Criteria	Findings	
9(a)	Contingency plans are documented, understood and tested to confirm their operability and to cover higher risks.	Through discussion with the Manager Audit and Risk and examination of relevant supporting documentation, we observed that: • Verve Energy has developed policies and manuals to facilitate an integration of risk management, crisis management and business continuity management • As part of overall business continuity management framework, Verve Energy has established an Emergency Control Organisation (ECO) and Emergency Management Response (EMR) team at each site along with IT support • To respond to a crisis, a group Crisis Management Response (CMR) team may be convened on site or by teleconference to work closely with the Board, the Minister and relevant regulatory bodies • Verve Energy's business continuity management framework includes: ▪ Business continuity policy ▪ Business continuity manual containing information on crisis classification, relevant procedures, team roles, and logs and records to be maintained during crisis resolution ▪ Crisis response plan ▪ Emergency Management manual ▪ Emergency response plans and guidelines, specific to each power station or gas turbine site • Crisis Management and Business Continuity system and processes together with the handling of recent incidents are subject to a detailed annual review by the Manager Audit and Risk and the Executive Business Continuity Sponsor. Based on Verve Energy's risk management framework, a list of potential crises is also reviewed annually to ensure provisional crisis control plans are developed for the most critical scenarios • Where relevant and possible, emergency response plans are subject to testing in accordance with timeframes specified in the relevant plan. Testing takes the form of periodic 'live exercises' as well as desk top training. For example, the Emergency Response Plan for the: ▪ Pinjar Gas Turbine site requires testing to be performed on an annual basis, with the test occurring by October each year ▪ Muja Power Station site involves testing of evacuation drills and emergency scenarios in accordance with a formal schedule established and monitored by the site's incident controller. • The Business continuity manual requires the Manager Audit and Risk to facilitate a crisis scenario exercise with a CMR team on an annual basis, or upon major change to crisis management team membership. We sighted evidence of the crisis management exercise conducted on 11 April 2011. We also observed evidence of Verve Energy's review and testing of system recovery and restart plans. Particularly, we sighted the documentation supporting Verve Energy's demonstration of the execution of its emergency response plan for the Muja AB boiler tube failure incident (an O&M Agreement with Vinalco provides for Verve Energy to apply its emergency and crisis response processes to Muja AB). We also examined a report of a detailed review conducted in February 2012 and reported to the Audit and Risk Management Committee (ARMC) in September 2012.	
		Adequacy Rating: Adequately defined (A)	**Performance Rating:** Performing effectively (1)

Financial planning

Key process: The financial planning component of the asset management plan brings together the financial elements of the service delivery to ensure its financial viability over the long term.

Expected outcome: A financial plan that is reliable and provides for the long-term financial viability of the services.

No	Effectiveness Criteria	Findings	
10(a)	The financial plan states the financial objectives and strategies and actions to achieve the objectives	Through discussion with the Head of Financial Planning & Analysis and consideration of Verve Energy's financial planning mechanisms, we observed that in preparation of a portfolio level financial plan: • The financial objectives and strategies of Verve Energy are driven by its overall corporate objectives as well as input from Operations and other strategic business units • PowrSym modelling is used to determine financial targets for each strategic business unit (such as Operations, Trading & Fuel and Corporate Services), as part of Strategic Planning process that is independent of the State Budget Forecast process • The financial plans for each strategic business unit are supported by strategies and action plans for achieving the financial targets • Site analysts at each asset submit a plan and budget covering labour requirements, maintenance requirements and other operational costs. The maintenance plan is determined based on scheduled work for major items plus base workload. Data is sourced from the maintenance system and with reference to the five year plan for each asset.	
		Adequacy Rating: Adequately defined (A)	**Performance Rating:** Performing effectively (1)

10(b)	The financial plan identifies the source of funds for capital expenditure and recurrent costs	Through discussion with the Head of Financial Planning & Analysis and consideration of Verve Energy's financial planning mechanisms, we observed that in preparation of a portfolio level financial plan:
		• Verve Energy has access to funds mainly from three sources:
		  ▪ Revenue from operations
		  ▪ Debt facility from WA Treasury (up to $1 billion)
		  ▪ Equity injection by government
		• An application for funds made by Verve Energy is required to be in accordance with the Delegated Financial Authority which specifies that any expenditure commitment over $20 million must be approved by the Minister
		• Site level plans are drawn by analysts at each site, which are rolled up into the portfolio level financial plan.	

		Adequacy Rating: Adequately defined (A)	**Performance Rating:** Performing effectively (1)

No	Effectiveness Criteria	Findings	
10(c)	The financial plan provides projections of operating statements (profit and loss) and statement of financial position (balance sheets)	Through discussions with the Head of Financial Planning & Analysis and consideration of Verve Energy's financial planning mechanisms, we observed that: • Detailed level projections of operating statements and statement of financial position occur at a portfolio level after taking into account operational information from individual assets • Projections of detailed monthly profit and loss are also prepared for each strategic business unit • The financial plan for the Operations group also includes a separate projection of monthly P&L subdivided into operational, maintenance, logistics and staff for each of Muja CD and Kwinana power stations.	
		Adequacy Rating: Adequately defined (A)	**Performance Rating:** Performing effectively (1)
10(d)	The financial plan provides firm predictions on income for the next five years and reasonable indicative predictions beyond this period	Through discussions with the Head of Financial Planning & Analysis and consideration of Verve Energy's financial planning mechanisms, we observed that: • As part of the annual State Budget Forecast process, a five year forecast of income and expenses is prepared at a portfolio level (being a collation of plans and forecasts prepared for each asset) and submitted to the Department of Treasury for review, prior to inclusion in the State budget • Detailed information is provided for each item in the five year forecasts, including underlying assumptions and financial impacts and presented for review to Verve Energy's Board • A financial plan analysis pack is prepared each year to track variance of annual financial plan from the state budget forecasts. We note that the forecast does not provide detail of each asset's revenue and therefore impact on financial objectives and strategies of individual assets.	
		Adequacy Rating: Adequately defined (A)	**Performance Rating:** Performing effectively (1)
10(e)	The financial plan provides for the operations and maintenance, administration and capital expenditure requirements of the services	Through discussions with the Head of Financial Planning & Analysis and examination of the financial plans for the three years relevant to this review, we determined that: • A detailed financial plan is prepared for the Operations group and other strategic business units, which includes a detailed monthly Profit & Loss for each of the major assets • The financial plan for operations considers operational costs relating to engineering, maintenance and administration and provides a separate monthly Profit & Loss for each of these costs • Site analysts at each asset are required to submit a plan that covers requirements for labour, maintenance, administration, materials, contractors and other operational costs. The maintenance plan is determined based on scheduled work plus availability requirements • For Muja CD and Kwinana power stations, a separate monthly Profit & Loss is prepared for each of the operational costs relating to logistics, staff, engineering, maintenance and operations • The financial plan is supported by a capital expenditure plan which outlines projects and associated expenditure for each asset.	
		Adequacy Rating: Adequately defined (A)	**Performance Rating:** Performing effectively (1)

No	Effectiveness Criteria	Findings	
10(f)	Significant variances in actual/budget income and expenses are identified and corrective action taken where necessary	Through discussions with the Head of Financial Planning & Analysis and an examination of Financial Plans for the three years under review, we observed: • Dashboard reports are produced on a monthly basis for each asset, enabling management to specifically assess actual v budgeted expenditure for each asset, identify sites that are over budget or problematic and determine necessary corrective action • A high level business performance report is produced on a monthly basis for the Board's review that tracks performance of all the strategic business units on a year to date basis including an analysis of budget variance • Forced outage factors and plant availability are amongst the key performance indicators that are tracked in the dashboard reports. In relation to the Muja AB project, which experienced significant variances in costs incurred and forecast throughout the project, we observed the processes established for monitoring those variances on a weekly basis and reporting the financial status of the project to the Board on at least a monthly basis, enabling required corrective action to be identified and taken in a timely manner.	
		Adequacy Rating: Adequately defined (A)	**Performance Rating:** Performing effectively (1)

Capital expenditure planning

Key process: The capital expenditure plan provides a schedule of new works, rehabilitation and replacement works, together with estimated annual expenditure on each over the next five or more years. Since capital investments tend to be large and lumpy, projections would normally be expected to cover at least 10 years, preferably longer. Projections over the next five years would usually be based on firm estimates.

Expected outcome: A capital expenditure plan that provides reliable forward estimates of capital expenditure and asset disposal income, supported by documentation of the reasons for the decisions and evaluation of alternatives and options.

No	Effectiveness Criteria	Findings	
11(a)	There is a capital expenditure plan that covers issues to be addressed, actions proposed, responsibilities and dates	Through discussions with the Head of Financial Planning and Analysis, consideration of Verve Energy's capital planning procedures and examination of the capital expenditure plans for the assets, we determined that: • A capital expenditure plan is included in the annual financial plan for each strategic business unit, where relevant • Capital expenditure planning is undertaken along with financial planning on a five year basis, as part of the State Budget Forecasting process • The plan provides information on the amount of budgeted capital expenditure, purpose and description of the spend and the asset to which it relates • All capital expenditure projects over $20 million require an approval from the Minister in accordance with the Delegated Financial Authority.	
		Adequacy Rating: Adequately defined (A)	**Performance Rating:** Performing effectively (1)
11(b)	The plan provides reasons for capital expenditure and timing of expenditure	Through discussions with the Head of Financial Planning and Analysis, consideration of Verve Energy's capital planning procedures and an examination of the capital expenditure plans for the assets, we determined that each business unit's capital expenditure plan outlines the: • Individual capital projects by site (e.g. power station) • Details of the financial year in which the capital expenditure amount is planned • Reasons for the expenditure.	
		Adequacy Rating: Adequately documented (A)	**Performance Rating:** Performing effectively (1)

No	Effectiveness Criteria	Findings	
11(c)	The capital expenditure plan is consistent with the asset life and condition identified in the asset management plan	Through discussions with the Head of Financial Planning and Analysis, consideration of Verve Energy's capital planning procedures and an examination of the capital expenditure plans for the assets, we determined that: • Capital expenditure plans are prepared using the maintenance optimisation decision support system OMSP, which is a mathematical modelling tool to analyse and optimise expenditure by evaluating the interaction between plant condition, maintenance spending, investment spending, operating regime and reliability targets. • Plant life and conditions are determined using the plant life usage decision support system PLUS that identifies, predicts and ranks plant condition, degradation and residual life, and provides an indication of the optimum spending program • PLUS/OMSP programs are carried out every 4 years. In the interim years, annual reviews of assets are conducted • Verve Energy's procedures address the requirement for life cycle costs of assets to be assessed and recorded in formal project evaluations • Verve Energy's procedures address the requirement for investment and capital expenditure estimates to be calculated and disclosed within the project evaluation phase.	
		Adequacy Rating: Adequately documented (A)	**Performance Rating:** Performing effectively (1)
11(d)	There is an adequate process to ensure that the capital expenditure plan is regularly updated and actioned	Through discussions with the Head of Financial Planning and Analysis, consideration of Verve Energy's capital planning procedures and an examination of the capital expenditure plans for selected assets, we determined that: • The capital plan is annually reviewed internally along with the financial plan to ensure consistent alignment with current business and strategic plans • The capital plan is also reviewed annually as part of the State Budget forecasting process • When projects are completed they are reviewed against the approved criteria to test whether the project objectives were met. We sighted an independent review report that assessed the planned and completed capital expenditure work and the business cases used to justify the work, including future planned capital expenditure and its alignment with expected plant availabilities and business case analysis.	
		Adequacy Rating: Adequately documented (A)	**Performance Rating:** Performing effectively (1)

Review of Asset Management System

Key process: The asset management system is regularly reviewed and updated.

Expected outcome: Review of the Asset Management System to ensure the effectiveness of the integration of its components and their currency.

<table>
<tr><th>No</th><th>Effectiveness Criteria</th><th colspan="2">Findings</th></tr>
<tr><td rowspan="2">12(a)</td><td rowspan="2">A review process is in place to ensure that the asset management plan and the asset management system described therein are kept current</td><td colspan="2">The Manager Portfolio Development & Optimisation is responsible for monitoring the asset management system and performing a review of the asset management plan on an annual basis.
Although components of Verve Energy's asset management system are subject to regular review and update, we noted that a formal process has not been established for ensuring the currency of the asset management system (including the currency of the collective references, which describe that system).
There is also some doubt as to whether there has been any "substantial" change to Verve Energy's asset management system, which would warrant notification to the Authority per section 14(1)(b) of the Act.</td></tr>
<tr><td>Adequacy Rating: Requires some improvement (B)</td><td>Performance Rating: Opportunity for improvement (2)</td></tr>
<tr><td rowspan="2">12(b)</td><td rowspan="2">Independent reviews (e.g. internal audit) are performed of the asset management system</td><td colspan="2">Although components of Verve Energy's asset management system are subject to regular review and update, as noted at 12(a) above, a formal process has not been established for ensuring the currency of the asset management system. Such a formal process should also address the need for a sufficient degree of independence in that review.</td></tr>
<tr><td>Adequacy Rating: Requires some improvement (B)</td><td>Performance Rating: Opportunity for improvement (2)</td></tr>
<tr><td></td><td colspan="2">Recommendation 4/2013
Establish a formal review process for ensuring the currency of the asset management system, including the currency of the collective references, which describe that system.
Such a formal process should also address the need for a sufficient degree of independence in that review.</td><td>Action Plan 4/2013
Verve Energy will establish a formal review process for ensuring the currency of the asset management system, including the currency of the collective references, which describe that system.

Responsible Person: Manager Portfolio Development & Optimisation
Target Date: December 2013</td></tr>
</table>

5 Follow-up of previous review action plans

Rec. No	Ref	Recommendation	Previous Review Action Plan	Status	Revised action plan (if applicable)
1	1(h)	The position on Kwinana A be considered –the care and maintenance program for the turbines and boilers be aligned to a consistent level for both boilers and generation plant. (Non mandatory recommendation – Audit Guidelines 11.9).	A KPS Stage A Plant Preservation Project Decommissioning and Preservation Activities Report will be produced and implemented. **Responsible Person:** Chief Operating Officer **Target Date:** 31 December 2010	***Complete*** Verve Energy has produced a Plant Preservation Project Decommissioning and Preservation Activities Report for Kwinana Power Station Stage A.	N/A
2	4(b)	The effectiveness of fire management will be monitored when the survey of endangered flora is complete at Muja. An inspection will be scheduled after bush fire clearing. (Non Mandatory recommendation – Audit guidelines 11.9).	The flora update survey will be completed, fire breaks will be established and DEC fuel reduction burns will be implemented. **Responsible Person:** Chief Operating Officer **Target Date:** 31 December 2010	***Complete*** Verve Energy has completed the flora update survey, established fire breaks and implemented DEC fuel reduction burns.	N/A

Appendix A – Review plan

Verve Energy

Electricity Generation Licence (EGL7)

2013 Asset Management System Review

Review Plan

May 2013

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1 Introduction

Overview

The Economic Regulation Authority (**the Authority**) has under the provisions of the Electricity Industry Act 2004 (**Electricity Act**), issued to Electricity Generation Corporation T/A Verve Energy (**Verve Energy**) an Electricity Generation Licence (EGL7) (**the Licence**).

Section 14 of the Electricity Act requires Verve Energy to provide the Authority an asset management systems review (**the review**) conducted by an independent expert acceptable to the Authority not less than once in every 24 month period. With the Authority's approval, Deloitte Touche Tohmatsu (**Deloitte**) has been appointed to conduct the review for the period 1 April 2010 to 31 March 2013. Note that the Authority increased Verve Energy's review period to 36 months based on the findings from the 2010 asset management system review.

Verve Energy has been granted a licence to construct and operate, or operate existing electricity generating works throughout the South West Interconnected System (SWIS) network. Verve Energy is the largest electricity generator in the SWIS network.

The review will be conducted in accordance with the August 2010 issue of the *Audit Guidelines: Electricity, Gas and Water Licences* (**Audit Guidelines**). In accordance with the Audit Guidelines this document represents the Review Plan (**the Plan**) that is to be agreed upon by Deloitte and Verve Energy and presented to the Authority for approval.

Objective

The objective of the review is to independently examine the effectiveness and performance of the respective asset management systems established for assets subject to Verve Energy's Licence.

Scope

In accordance with the Audit Guidelines, the review will consider the effectiveness of Verve Energy's existing control procedures within the 12 key processes in the asset management life-cycle as outlined below at Table 1. Each key process and effectiveness criteria is applicable to Verve Energy's Licence and as such will be individually considered as part of the review.

Table 1 – Asset management system key processes and effectiveness criteria

#	Key processes	Effectiveness criteria
1	Asset planning	• Planning processes and objectives reflect the needs of all stakeholders and is integrated with business planning • Service levels are defined • Non-asset operations (e.g. demand management) are considered • Lifecycle costs of owning and operating assets are assessed • Funding options are evaluated • Costs are justified and cost drivers identified • Likelihood and consequences of asset failure are predicted • Plans are regularly reviewed and updated.

#	Key processes	Effectiveness criteria
2	Asset creation and acquisition	• Full project evaluations are undertaken for new assets, including comparative assessment of non-asset solutions • Evaluations include all life-cycle costs • Projects reflect sound engineering and business decisions • Commissioning tests are documented and completed • Ongoing legal/environmental/safety obligations of the asset owner are assigned and understood.
3	Asset disposal	• Under utilised and under performing assets are identified as part of a regular systematic review process • The reasons for under-utilisation or poor performance are critically examined and corrective action or disposal undertaken • Disposal alternatives are evaluated • There is a replacement strategy for assets.
4	Environmental analysis (all external factors that affect the system)	• Opportunities and threats in the system environment are assessed • Performance standards (availability of service, capacity, continuity, emergency response, etc) are measured and achieved • Compliance with statutory and regulatory requirements • Achievement of customer service levels.
5	Asset operations	• Operational policies and procedures are documented and linked to service levels required • Risk management is applied to prioritise operations tasks • Assets are documented in an Asset register, including asset type, location, material, plans of components, an assessment of assets' physical/structural condition and accounting data • Operational costs are measured and monitored • Staff receive training commensurate with their responsibilities.
6	Asset maintenance	• Maintenance policies and procedures are documented and linked to service levels required • Regular inspections are undertaken of asset performance and condition • Maintenance plans (emergency, corrective and preventative) are documented and completed on schedule • Failures are analysed and operational/maintenance plans adjusted where necessary • Risk management is applied to prioritise maintenance tasks • Maintenance costs are measured and monitored.

#	Key processes	Effectiveness criteria
7	Asset management information system	• Adequate system documentation for users and IT operators • Input controls include appropriate verification and validation of data entered into the system • Logical security access controls appears adequate, such as passwords • Physical security access controls appear adequate • Data back-up procedures appear adequate • Key computations related to licensee performance reporting are materially accurate • Management reports appear adequate for the licensee to monitor licence obligations.
8	Risk management	• Risk management policies and procedures exist and are being applied to minimise internal and external risks associated with the asset management system • Risks are documented in a risk register and treatment plans are actioned and monitored • The probability and consequences of asset failure are regularly assessed.
9	Contingency planning	Contingency plans are documented, understood and tested to confirm their operability and to cover higher risks.
10	Financial planning	• The financial plan states the financial objectives and strategies and actions to achieve the objectives • The financial plan identifies the source of funds for capital expenditure and recurrent costs • The financial plan provides projections of operating statements (profit and loss) and statement of financial position (balance sheets) • The financial plan provide firm predictions on income for the next five years and reasonable indicative predictions beyond this period • The financial plan provides for the operations and maintenance, administration and capital expenditure requirements of the services • Significant variances in actual/budget income and expenses are identified and corrective action taken where necessary.
11	Capital expenditure planning	• There is a capital expenditure plan that covers issues to be addressed, actions proposed, responsibilities and dates • The plan provide reasons for capital expenditure and timing of expenditure • The capital expenditure plan is consistent with the asset life and condition identified in the asset management plan • There is an adequate process to ensure that the capital expenditure plan is regularly updated and actioned.

#	Key processes	Effectiveness criteria
12	Review of Asset Management System	• A review process is in place to ensure that the asset management plan and the asset management system described therein are kept current • Independent reviews (eg internal audit) are performed of the asset management system.

Responsibility

Verve Energy's responsibility for maintaining an effective asset management system

Verve Energy is responsible for putting in place policies, procedures and controls, which are designed to provide for an effective asset management system for assets subject to the Licence.

Deloitte's responsibility

Our responsibility is to express a conclusion on the effectiveness of Verve Energy's asset management systems to meet Licence requirements based on our procedures. We will conduct our engagement in accordance with Australian Standard on Assurance Engagements *ASAE 3500 Performance Engagements* issued by the Australian Auditing and Assurance Standards Board and the Audit Guidelines, in order to state whether, based on the procedures performed, anything has come to our attention that causes us to believe that Verve Energy's asset management system has not been operating effectively, in all material respects, in accordance with the Audit Guidelines. Our engagement will provide limited assurance as defined in ASAE 3500.

Limitations of use

Our report will be produced solely for the management of Verve Energy, for the purpose of meeting the reporting requirements of section 14 of the Act. We disclaim any assumption of responsibility for any reliance on this report to any person other than the management of Verve Energy for any purpose other than that for which it was prepared. We disclaim all liability to any other party for all costs, loss, damages, and liability that the other party might suffer or incur arising from or relating to or in any way connected with the contents of our report, the provision of our report to the other party, or the reliance on our report by the other party.

Inherent limitations

A limited assurance engagement is substantially less in scope than a reasonable assurance engagement conducted in accordance with ASAE 3500 and consequently does not allow us to obtain assurance that we would become aware of all significant matters that might be identified in a reasonable assurance engagement. Accordingly, we will not express an opinion providing reasonable assurance.

We cannot, in practice, examine every activity and procedure, nor can we be a substitute for management's responsibility to maintain adequate controls over all levels of operations and their responsibility to prevent and detect irregularities, including fraud. Accordingly, readers of our report should not rely on the report to identify all potential opportunities for improvement which may be required.

Any projection of the evaluation of the level of effectiveness to future periods is subject to the risk that the systems may become inadequate because of changes in conditions, or that the degree of effectiveness with management procedures may deteriorate.

Independence

In conducting our engagement, we will comply with the independence requirements of the Australian professional accounting bodies.

2 Approach

The review will be conducted in three distinct phases, being a risk assessment, system analysis/policy and procedure review and examination of performance. From the review results, a report will be produced to outline findings, overall assessments and recommendations for improvement in line with the Audit Guidelines. Each step of the review is discussed in detail below.

Risk assessment

The review will focus on identifying or assessing those activities and management control systems to be examined and the matters subject to review. Therefore, the purpose of conducting the risk assessment as a preliminary phase enables the reviewer to focus on pertinent/high risk areas of Verve Energy's licence obligations. The risk assessment gives specific consideration to the status of post review action plans devised in response to previous review recommendations, changes to Verve Energy's systems and processes and any matters of significance raised by the Authority and/or Verve Energy. The level of risk and materiality of the process determine the level of review required i.e. the greater the materiality and the higher the risk, the more effort will be applied.

The first step of the risk assessment is the rating of the potential consequences of Verve Energy not meeting its licence obligations, in the absence of mitigating controls. The consequence rating descriptions listed at Table 10 of the Audit Guidelines (refer to **Appendix 1-1**), provides the risk assessment with context to enable the appropriate consequence rating to be applied to each obligation subject to review.

Once the consequence has been determined, the likelihood of Verve Energy not meeting its licence obligations (against the defined effectiveness criteria) is assessed using the likelihood rating listed at Table 11 of the Audit Guidelines (refer to **Appendix 1-2**). The assessment of likelihood is based on the expected frequency of non-performance against the defined criteria, over a period of time.

Table 2 below (sourced from Table 12 of the Audit Guidelines) outlines the combination of consequence and likelihood ratings to determine the level of inherent risk associated with each individual effectiveness criteria.

Table 2: Inherent risk rating

	Consequence		
Likelihood	Minor	Moderate	Major
Likely	Medium	High	High
Probable	Low	Medium	High
Unlikely	Low	Medium	High

Once the level of inherent risk has been determined, the adequacy of existing controls is assessed in order to determine the level of control risk. Controls are assessed and prioritised as weak, moderate or strong dependant on their suitability to mitigate the risks identified. The control adequacy ratings used by this risk assessment are aligned to the ratings listed at Table 14 of the Audit Guidelines (refer to **Appendix 1-3**).

Once inherent risks and control risks are established, the review priority can then be determined using the matrix listed at Table 15 of the Audit Guidelines (refer to **Table 3** below). Essentially, the higher the level of risk the greater the level of examination is required.

Table 3: Assessment of Review Priority

	Adequacy of existing controls		
Inherent Risk	Weak	Moderate	Strong
High	Review priority 1	Review priority 2	
Medium	Review priority 3	Review priority 4	
Low	Review priority 5		

The following table outlines the review requirement for each level of review priority. Testing can range from extensive substantive testing around the controls and activities of particular processes to confirming the existence of controls through discussions with relevant staff.

Table 4: Review Priority Table

Priority Rating and Resulting Review Procedures	
Rating	Review requirement
Priority 1	• Controls testing and extensive substantive testing of activities • Follow-up and if necessary, re-test matters previously reported.
Priority 2	• Controls testing and moderate substantive testing of activities • Follow-up and if necessary, re-test matters previously reported.
Priority 3	• Limited controls testing (moderate sample size). Only substantively test activities if further control weakness found • Follow-up of matters previously reported.
Priority 4	• Confirmation of existing controls via observation and walk through testing • Follow-up of matters previously reported.
Priority 5	• Confirmation of existing controls via observation, discussions with key staff and/or reliance on key references (“desktop review”).

The risk assessment has been discussed with stakeholders to gain their input as to the appropriateness and factual accuracy of risk and control ratings and associated explanations. The key sources considered in reaching our preliminary assessment of the risk and control ratings were:

- The previous asset management system review report (July 2010) and associated review plan and risk assessment
- Initial interviews with key Verve Energy staff
- Relevant records of Verve Energy’s correspondence with the Authority’s Secretariat
- Observations of the Authority’s Secretariat.

At this stage, the risk assessment can only be a preliminary assessment based on reading of documentation and interviews by the reviewers. It is possible that the ratings and risk assessment comments may be revised as we conduct our work and new evidence comes to light. Accordingly the risk assessment for the asset management system review is a preliminary draft, not a final report, and no reliance should be placed on its findings. It is however an invaluable tool for focussing the review effort.

The asset management system review risk assessment is attached at **Appendix 2**.

Systems analysis/policy and procedure review

The level of policy and procedure review required will be determined utilising the aforementioned priority scale. Once the priority level has been defined, the review will consist of:

- Interviewing key operational and administrative staff responsible for the development and maintenance of policies and procedural type documentation
- Examination of documented policies and procedures for key functional requirements and consideration of their relevance to Verve Energy's asset management system requirements and standards.

The policy and procedure definition element of the asset management system review will be performed to provide a rating as defined under Table 5 (refer below).

Key documents which may be subject to review are not specifically disclosed in this plan. A list of documents examined will be included in the review report.

Examination of performance

The actual performance of the relevant controls and processes in place will then be examined via:

- Consideration of reports and references evidencing activity
- Interviews with key operational staff
- Physical visits to the Muja and Kwinana power stations and the Gas Turbines and Sustainable Operations Branch (Kewdale office)
- Consideration of Verve Energy's management of planned outage rates, particularly at the facilities listed on page xiv of the 2011 Annual Wholesale Electricity Market Report for the Minister for Energy (Muja G7, Kwinana G5, Kwinana G6 and Pinjar GT11)
- Consideration of the level of staff resourcing applied to maintaining those controls and processes
- Consideration of each installation's function, normal modes of operation and age.

A full work program will be completed to record the specific aspects of our review and examination of the performance of each asset management system key process. This work program will be based on:

- The review priority determined by the risk assessment to be applicable to each effectiveness criteria
- The results of the policy and procedure review, as described above
- The location of personnel and activity to be tested.

The performance effectiveness element of the asset management system review will be performed to provide a rating as defined under Table 6 (refer below).

Reporting

In accordance with the Audit Guidelines, the reviewer must provide an assessment of both the process and policy definition rating (refer to **Table 5** below and also **Table 5** of the Audit Guidelines) and the performance rating (refer to **Table 6** below and also **Table 6** of the Audit Guidelines) for each of the key processes in Verve Energy's asset management system.

Table 5: Asset management process and policy definition adequacy ratings

Rating	Description	Criteria
A	Adequately defined	• Processes and policies are documented. • Processes and policies adequately document the required performance of the assets. • Processes and policies are subject to regular reviews, and updated where necessary • The asset management information system(s) are adequate in relation to the assets that are being managed.
B	Requires some improvement	• Process and policy documentation requires improvement. • Processes and policies do not adequately document the required performance of the assets. • Reviews of processes and policies are not conducted regularly enough. • The asset management information system(s) require minor improvements (taking into consideration the assets that are being managed).
C	Requires significant improvement	• Process and policy documentation is incomplete or requires significant improvement. • Processes and policies do not document the required performance of the assets. • Processes and policies are significantly out of date. • The asset management information system(s) require significant improvements (taking into consideration the assets that are being managed).
D	Inadequate	• Processes and policies are not documented. • The asset management information system(s) is not fit for purpose (taking into consideration the assets that are being managed).

Table 6: Asset management performance ratings

Rating	Description	Criteria
1	Performing effectively	• The performance of the process meets or exceeds the required levels of performance. • Process effectiveness is regularly assessed and corrective action taken where necessary.
2	Opportunity for improvement	• The performance of the process requires some improvement to meet the required level. • Process effectiveness reviews are not performed regularly enough. • Process improvement opportunities are not actioned.
3	Corrective action required	• The performance of the process requires significant improvement to meet the required level. • Process effectiveness reviews are performed irregularly, or not at all. • Process improvement opportunities are not actioned.
4	Serious action required	• Process is not performed, or the performance is so poor that the process is considered to be ineffective.

The asset management review report will be structured to address all key components expected by the Audit Guidelines, including:

- Response to previous review recommendations (refer to **Appendix 3**)
- Performance summary and rating for each effectiveness criteria (Table 1), utilising the asset management process and policy definition adequacy ratings (Table 5) and the asset management performance ratings (Table 6)
- Review observations for each effectiveness criteria
- Status and response to recommendations from the previous review
- Where appropriate, recommendations on actions required to address opportunities for improvement.

Where appropriate, Verve Energy will provide post review implementation plans for incorporation into the report as an appendix.

3 General information

All aspects of the review will undergo quality assurance and review procedures as outlined in our previous communications. Before delivery of a final report, full quality procedures will be applied, including second partner review.

Key Verve Energy contacts

The key contacts for this review are:

- Andrew Everett, Manager Trading & Regulation
- Jacinda Papps, Senior Regulatory Analyst
- Jan Ferreira, Manager Financial Planning & Analysis
- Shane Reffold, Manager Portfolio Development & Optimisation
- Andy Wearmouth, Chief Engineer
- Ian Normington - Manager Muja Power Station
- Ivan d'Rosario - Operations Superintendent, Muja
- Bill Willing - Maintenance Superintendent, Muja
- Iain Hensby - Engineering Superintendent, Muja
- Leigh Amos - Manager Kwinana Power Station
- John Rampellini - Production Superintendent, Kwinana
- Richard Luke - Engineering Superintendent, Kwinana
- Kim Bycroft - Operations Superintendent, Gas Turbines and Sustainable Operations, Kewdale
- Karen Bateman, Manager Risk & Audit.

Deloitte Staff

Deloitte staff who will be involved with this assignment are:

- Richard Thomas — Partner
- Andrew Baldwin — Account Director
- Amit Grover — Senior Analyst
- Darren Gerber — Partner (Quality Assurance Review)

Deloitte staff will be supported by the following KT & Sai Associates staff:

- Tanuja Sanders — Principal Mechanical Engineer
- Clive Lancaster — Principal Electrical Engineer

Resumes for key Deloitte and KT & Sai Associates staff are outlined in the proposal accepted by Verve Energy and subsequently presented to the Authority.

Timing

The initial risk assessment phase was completed on 25 March 2013. On 26 March 2013 the review plan and detailed risk assessment were presented to the Authority for review and comment. The review plan was subsequently amended on 13 May 2013 to address the Secretariat's observations and requests.

The remainder of the fieldwork phase is scheduled to be performed in April and May 2013.

Deloitte's time and staff commitment to the completion of the review is outlined in the proposal accepted by Verve Energy and subsequently presented to the Authority. In summary, the estimated time allocated to each activity is as follows:

- Planning (including risk assessment): 22 hours
- Fieldwork (including system analysis/policy & procedure review and examination of performance): 116 hours
- Reporting: 37 hours.

Appendix 1 – Risk assessment key

1-1 Consequence ratings

Source: Audit Guidelines – Electricity, Gas and Water Licences August 2010

	Rating	Examples of non-compliance			
		Supply Quality	Supply Reliability	Consumer Protection	Breaches of legislation or other licence conditions
1	Minor	Minor public health and safety issues. Breach of quality standards minor - minimal impact on customers.	System failure or connection delays affecting only a few customers. Some inconvenience to customers.	Customer complaints procedures not followed in a few instances. Nil or minor costs incurred by customers.	Licence conditions not fully complied with but issues have been promptly resolved.
2	Moderate	Event is restricted in both area and time e.g., supply of service to one street is affected up to one day. Some remedial action is required.	Event is restricted in both area and time e.g., supply of service to one street is affected up to one day. Some remedial action is required.	Lapse in customer service standards is clearly noticeable but manageable. Some additional costs may be incurred by some customers.	Clear evidence of one or more breaches of legislation or other licence conditions and/or sustained period of breaches.
3	Major	Significant system failure. Life-threatening injuries or widespread health risks. Extensive remedial action required.	Significant system failure. Extensive remedial action required.		

1-2 Likelihood ratings

Source: Audit Guidelines – Electricity, Gas and Water Licences August 2010

	Level	Criteria
A	Likely	Non-compliance is expected to occur at least once or twice a year
B	Probable	Non-compliance is expected to occur every three years
C	Unlikely	Non-compliance is expected to occur at least once every 10 years or longer

1-3 Adequacy ratings for existing controls

Source: Audit Guidelines – Electricity, Gas and Water Licences August 2010

Rating	Description
Strong	Strong controls that are sufficient for the identified risks
Moderate	Moderate controls that cover significant risks; improvement possible
Weak	Controls are weak or non-existent and have minimal impact on the risks

Appendix 2 – Risk assessment

1	Asset Planning
Key Process:	Asset planning strategies are focused on meeting customer needs in the most effective and efficient manner (delivering the right service at the right price).
Outcome:	Integration of asset strategies into operational or business plans will establish a framework for existing and new assets to be effectively utilised and their service potential optimised.

Ref	Effectiveness criteria	Consequence	Likelihood	Inherent Risk Rating	Controls Assessment	Review Priority
1(a)	Planning process and objectives reflect the needs of all stakeholders and is integrated with business planning	Minor	Probable	Low	Moderate	Priority 5
1(b)	Service levels are defined	Minor	Unlikely	Low	Moderate	Priority 5
1(c)	Non-asset options (e.g. demand management) are considered	Minor	Probable	Low	Moderate	Priority 5
1(d)	Lifecycle costs of owning and operating assets are assessed	Moderate	Probable	Medium	Moderate	Priority 4
1(e)	Funding options are evaluated	Minor	Probable	Low	Moderate	Priority 5
1(f)	Costs are justified and cost drivers identified	Moderate	Probable	Medium	Moderate	Priority 4
1(g)	Likelihood and consequences of asset failure are predicted	Major	Probable	High	Moderate	Priority 2
1(h)	Plans are regularly reviewed and updated	Minor	Unlikely	Low	Moderate	Priority 5

2	Asset Creation and Acquisition
Key Process:	Asset creation/acquisition means the provision or improvement of an asset where the outlay can be expected to provide benefits beyond the year of outlay
Outcome:	A more economic, efficient and cost-effective asset acquisition framework which will reduce demand for new assets, lower service costs and improve service delivery.

Ref	Effectiveness criteria	Consequence	Likelihood	Inherent Risk Rating	Controls Assessment	Review Priority
2(a)	Full project evaluations are undertaken for new assets, including comparative assessment of non-asset solutions	Moderate	Probable	Medium	Moderate	Priority 4
2(b)	Evaluations include all life-cycle costs	Moderate	Probable	Medium	Moderate	Priority 4
2(c)	Projects reflect sound engineering and business decisions	Moderate	Probable	Medium	Moderate	Priority 4
2(d)	Commissioning tests are documented and completed	Moderate	Unlikely	Medium	Moderate	Priority 4
2(e)	Ongoing legal/environmental/ safety obligations of the asset owner are assigned and understood	Major	Unlikely	High	Moderate	Priority 2

3	Asset Disposal
Key Process:	Effective asset disposal frameworks incorporate consideration of alternatives for the disposal of surplus, obsolete, under-performing or unserviceable assets. Alternatives are evaluated in cost-benefit terms.
Outcome:	Effective management of the disposal process will minimise holdings of surplus and under-performing assets and will lower service costs.

Ref	Effectiveness criteria	Consequence	Likelihood	Inherent Risk Rating	Controls Assessment	Review Priority
3(a)	Under-utilised and under-performing assets are identified as part of a regular systematic review process	Minor	Probable	Low	Moderate	Priority 5
3(b)	The reasons for under-utilisation or poor performance are critically examined and corrective action or disposal undertaken	Minor	Probable	Low	Moderate	Priority 5
3(c)	Disposal alternatives are evaluated	Minor	Probable	Low	Moderate	Priority 5
3(d)	There is a replacement strategy for assets	Moderate	Probable	Medium	Moderate	Priority 4

4	Environmental analysis
Key Process:	Environmental analysis examines the asset system environment and assesses all external factors affecting the asset system.
Outcome:	The asset management system regularly assesses external opportunities and threats and takes corrective action to maintain performance requirements.

Ref	Effectiveness criteria	Consequence	Likelihood	Inherent Risk Rating	Controls Assessment	Review Priority
4(a)	Opportunities and threats in the system environment are assessed	Moderate	Probable	Medium	Moderate	Priority 4
4(b)	Performance standards (availability of service, capacity, continuity, emergency response, etc) are measured and achieved	Moderate	Probable	Medium	Moderate	Priority 4
4(c)	Compliance with statutory and regulatory requirements	Moderate	Unlikely	Medium	Moderate	Priority 4
4(d)	Achievement of customer service levels	Moderate	Probable	Medium	Moderate	Priority 4

5	Asset operations
Key Process:	Operational functions relate to the day-to-day running of assets and directly affect service levels and costs.
Outcome:	Operations plans adequately document the processes and knowledge of staff in the operation of assets so that service levels can be consistently achieved.

Ref	Effectiveness criteria	Consequence	Likelihood	Inherent Risk Rating	Controls Assessment	Review Priority
5(a)	Operational policies and procedures are documented and linked to service levels required	Moderate	Unlikely	Medium	Strong	Priority 4
5(b)	Risk management is applied to prioritise operations tasks	Moderate	Probable	Medium	Moderate	Priority 4
5(c)	Assets are documented in an Asset Register including asset type, location, material, plans of components, an assessment of assets' physical/structural condition and accounting data	Moderate	Probable	Medium	Moderate	Priority 4
5(d)	Operational costs are measured and monitored	Moderate	Probable	Medium	Moderate	Priority 4
5(e)	Staff receive training commensurate with their responsibilities	Moderate	Probable	Medium	Moderate	Priority 4

6	Asset maintenance
Key Process:	Maintenance functions relate to the upkeep of assets and directly affect service levels and costs.
Outcome:	Maintenance plans cover the scheduling and resourcing of the maintenance tasks so that work can be done on time and on cost.

Ref	Effectiveness criteria	Consequence	Likelihood	Inherent Risk Rating	Controls Assessment	Review Priority
6(a)	Maintenance policies and procedures are documented and linked to service levels required	Major	Unlikely	Medium	Strong	Priority 2
6(b)	Regular inspections are undertaken of asset performance and condition	Moderate	Unlikely	Medium	Strong	Priority 4
6(c)	Maintenance plans (emergency, corrective and preventative) are documented and completed on schedule	Major	Probable	Medium	Moderate	Priority 2
6(d)	Failures *(including the significance of the failure)* are analysed and operational/maintenance plans adjusted where necessary	Major	Probable	Medium	Moderate	Priority 2
6(e)	Risk management is applied to prioritise maintenance tasks	Major	Probable	Medium	Moderate	Priority 2
6(f)	Maintenance costs are measured and monitored	Moderate	Probable	Medium	Moderate	Priority 4

7	Asset Management Information System
Key Process:	An asset management information system is a combination of processes, data and software that support the asset management functions.
Outcome:	The asset management information system provides authorised, complete and accurate information for the day-to-date running of the asset management system. The focus of the review is the accuracy of performance information used by the licensee to monitor and report on service standards.

Ref	Effectiveness criteria	Consequence	Likelihood	Inherent Risk Rating	Controls Assessment	Review Priority
7(a)	Adequate system documentation for users and IT operators	Minor	Probable	Low	Moderate	Priority 5
7(b)	Input controls include appropriate verification and validation of data entered into the system	Moderate	Probable	Medium	Moderate	Priority 4
7(c)	Logical security access controls appear adequate, such as passwords	Minor	Probable	Low	Moderate	Priority 5
7(d)	Physical security access controls appear adequate	Minor	Probable	Low	Moderate	Priority 5
7(e)	Data backup procedures appear adequate	Moderate	Probable	Medium	Moderate	Priority 4
7(f)	Key computations related to licensee performance reporting are materially accurate	Minor	Probable	Low	Moderate	Priority 5
7(g)	Management reports appear adequate for the licensee to monitor licence obligations	Minor	Probable	Low	Moderate	Priority 5

8	Risk Management
Key Process:	Risk management involves the identification of risks and their management within an acceptable level of risk.
Outcome:	An effective risk management framework is applied to manage risks related to the maintenance of service standards

Ref	Effectiveness criteria	Consequence	Likelihood	Inherent Risk Rating	Control Risk	Review Priority
8(a)	Risk management policies and procedures exist and are being applied to minimise internal and external risks associated with the asset management system	Major	Probable	High	Moderate	Priority 2
8(b)	Risks are documented in a risk register and treatment plans are actioned and monitored	Moderate	Probable	Medium	Moderate	Priority 4
8(c)	The probability and consequences of asset failure are regularly assessed	Moderate	Probable	Medium	Moderate	Priority 4

9	Contingency Planning
Key Process:	Contingency plans document the steps to deal with the unexpected failure of an asset.
Outcome:	Contingency plans have been developed and tested to minimise any significant disruptions to service standards.

Ref	Effectiveness criteria	Consequence	Likelihood	Inherent Risk Rating	Controls Assessment	Review Priority
9(a)	Contingency plans are documented, understood and tested to confirm their operability and to cover higher risks	Major	Probable	High	Strong	Priority 2

10	Financial Planning
Key Process:	The financial planning component of the asset management plan brings together the financial elements of the service delivery to ensure its financial viability over the long term.
Outcome:	A financial plan that is reliable and provides for the long-term financial viability of the services.

Ref	Effectiveness criteria	Consequence	Likelihood	Inherent Risk Rating	Controls Assessment	Review Priority
10(a)	The financial plan states the financial objectives and strategies and actions to achieve the objectives	Moderate	Probable	Medium	Moderate	Priority 4
10(b)	The financial plan identifies the source of funds for capital expenditure and recurrent costs	Minor	Unlikely	Low	Moderate	Priority 5
10(c)	The financial plan provides projections of operating statements (profit and loss) and statement of financial position (balance sheets)	Minor	Probable	Low	Moderate	Priority 5
10(d)	The financial plan provides firm predictions on income for the next five years and reasonable indicative predictions beyond this period	Minor	Probable	Low	Moderate	Priority 5
10(e)	The financial plan provides for the operations and maintenance, administration and capital expenditure requirements of the services	Moderate	Unlikely	Medium	Moderate	Priority 4
10(f)	Significant variances in actual/budget income and expenses are identified and corrective action taken where necessary	Moderate	Probable	Medium	Moderate	Priority 4

11	Capital expenditure planning
Key Process:	The capital expenditure plan provides a schedule of new works, rehabilitation and replacement works, together with estimated annual expenditure on each over the next five or more years. Since capital investments tend to be large and lumpy, projections would normally be expected to cover at least 10 years, preferably longer. Projections over the next five years would usually be based on firm estimates
Outcome:	A capital expenditure plan that provides reliable forward estimates of capital expenditure and asset disposal income, supported by documentation of the reasons for the decisions and evaluation of alternatives and options.

Ref	Effectiveness criteria	Consequence	Likelihood	Inherent Risk Rating	Controls Assessment	Review Priority
11(a)	There is a capital expenditure plan that covers issues to be addressed, actions proposed, responsibilities and dates	Moderate	Probable	Medium	Moderate	Priority 4
11(b)	The plan provides reasons for capital expenditure and timing of expenditure	Minor	Probable	Low	Moderate	Priority 5
11(c)	The capital expenditure plan is consistent with the asset life and condition identified in the asset management plan	Moderate	Probable	Medium	Moderate	Priority 4
11(d)	There is an adequate process to ensure that the capital expenditure plan is regularly updated and actioned	Minor	Probable	Low	Moderate	Priority 5

12	Review of AMS
Key Process:	The asset management system is regularly reviewed and updated.
Outcome:	Review of the Asset Management System to ensure the effectiveness of the integration of its components and their currency.

Ref	Effectiveness criteria	Consequence	Likelihood	Inherent Risk Rating	Controls Assessment	Review Priority
12(a)	A review process is in place to ensure that the asset management plan and the asset management system described therein are kept current	Minor	Probable	Low	Moderate	Priority 5
12(b)	Independent reviews (eg internal audit) are performed of the asset management system	Minor	Probable	Low	Moderate	Priority 5

Appendix 3 – Previous review recommendations

Recommendations are drawn from the Verve Energy 2010 Electricity Generation Licence Asset Management System Review dated July 2010. The report includes the following two recommendations and associated action plans.

Issue 1 – Asset Planning The care and maintenance program for turbines and boilers at Kwinana A are not consistent.	
Recommendation 1 The position on Kwinana A be considered –the care and maintenance program for the turbines and boilers be aligned to a consistent level for both boilers and generation plant. (Non mandatory recommendation – Audit Guidelines 11.9).	**Action plan 1** A KPS Stage A Plant Preservation Project Decommissiong and Preservation Activities Report will be produced and implemented. **Responsible Person:** Chief Operating Officer **Target Date:** December 2010

Issue 2 – Risk Management At Muja, there is a risk of bush fire that has the potential to damage the coal conveyors and interrupt supply. The site has been inspected for fire risks but is being surveyed for endangered flora before the bush clearing can be carried out.	
Recommendation 2 The effectiveness of fire management be monitored when the survey of endangered flora is complete at Muja. An inspection be scheduled after bush fire clearing. (Non-Mandatory recommendation – Audit guidelines 11.9).	**Action plan 2** The flora update survey will be completed, fire breaks will be established and DEC fuel reduction burns will be implemented. **Responsible Person:** Chief Operating Officer **Target Date:** December 2010

Appendix B – References

Verve Energy staff participating in the review

- Senior Regulatory Analyst
- Manager Trading & Regulation
- Manager Risk & Audit
- Manager Portfolio Development & Optimisation, Operations Business Unit
- General Manager Trading and Fuel
- Manager Commercial
- Environmental Manager
- Head of Financial Planning & Analysis
- IT&T Services Manager, Finance & Business Services
- Manager Muja Power Station
- Operations Superintendent, Muja
- Maintenance Superintendent, Muja
- Engineering Superintendent, Muja
- Manager Kwinana Power Station
- Production Superintendent, Kwinana
- Engineering Superintendent, Kwinana
- Operations Superintendent, Gas Turbines and Sustainable Operations.

Deloitte staff participating in the review

Name	Position	Hours
Richard Thomas	Partner	27
Andrew Baldwin	Account Director	66
Amit Grover	Senior Analyst	97
Darren Gerber	QA Partner	3.5

KT & Sai staff participating in the review

Name	Position	Hours
Tanuja Sanders	Principal Engineer & Director	36
Clive Lancaster	Principal Engineer	36

Key documents and other information sources examined

- Portfolio Asset Mission Report
- Asset management system process flowchart
- ERAP & PLUS Reports, Kwinana Stage C
- 2010, 2011 and 2012 Annual review reports, Kwinana Stage C
- ERAP & PLUS Reports, Muja C & D
- 2010, 2011 and 2012 Annual review reports, Muja C & D
- ERAP & PLUS Reports, Pinjar
- 2010, 2011 and 2012 Annual review reports, Pinjar
- ERAP/PLUS Annual Board Report
- BU Financial Plan - 2010-11, 2011-12 and 2012-13
- Delegated Financial Authority
- March 2013 Example Business Report
- April 2013 Example Dashboard Report
- Online compliance register – maintained on VNet
- Business Continuity Policy
- Crisis Response Plan

- Business Continuity Manual
- Emergency Response Plans – Pinjar GT and Muja Power Station sites
- Various correspondence between Verve Energy and the Authority
- Powerpoint presentation on Muja C&D Power Station – prepared for this review
- Powerpoint presentation on Gas Turbines & Sustainable Operations – prepared for this review
- Two GIRS reports on incidents at Kwinana Power Station
- Table of contents of Business Plan for Kwinana Power Station
- Power generation underwriting report for Pinjar GTPS
- Powerpoint slides on insurance site survey of Kwinana HEGTs
- Pressure equipment register for Kwinana HEGTs
- Assessment of risk based inspection of Kwinana HEGTs
- Two spreadsheets database of maintenance operations on Kwinana HEGTs
- Five year planned outage for Gas Turbines (2012-2017)
- Pinjar GT Unit 10 Combustion Inspection report (Sep-Oct 2012)
- DMS screenshot of Pinjar Stage C roof upgrade
- Pinjar GT Unit 10 Electrical Instrument inspection report (Sep-Oct 2011)
- Gas Turbines Spare parts refurbishment and procurement status spreadsheet
- Gas Turbines - Destructive testing of blades
- Repair report of 3 blades relating to Gas Turbines
- Gas Turbines - Incoming inspection report (April 2012)
- Risk register for Kwinana power station with mitigation action plans and responsibility
- Power point slides on Kwinana Power Station – prepared for this review
- Muja units 3 and 4 - Public Commissioning Test Plans (approved by System Management) for January and March 2013
- Due Diligence reports prepared in relation to the Vinalco JV arrangements and Muja AB Project – addressing insurance, accounting & taxation, legal, financial model, technical and market issues
- Auditor General preliminary review report to the Public Accounts Committee in July 2010
- Muja AB Power Station Refurbishment Project Operating &Maintenance agreement between Verve Energy and Vinalco, dated 29 September 2010.
- Minutes of Vinalco Board meetings
- Verve Energy corporate risk registers prepared in September 2010, December 2011 and December 2012
- Muja AB Refurbishment Project Risk Register – March 2010 and September 2011 versions
- July 2012Muja AB boiler tube failure incident risk assessment
- Various investigation reports into Muja AB boiler tube failure incident
- Extracts from various Verve Energy Board meeting agenda papers and minutes
- Muja A&B Boiler Repairs – monthly reports
- Various monthly and weekly operational reports, including financial activity.

Appendix C – Post Review Implementation Plan

2013 review

Issue 1/2013 *Asset operations: 5(e) Staff receive training commensurate with their responsibilities* In relation to the Kwinana Power Station, the extent of operator access to the Plant DCS system (as identified through the 2009 ERAP assessment) creates a minor exposure to operational errors and potential accidents. Current operator access levels allow operators to potentially alter parameters in protection systems, alarm limits and bypass permissives. More focussed operator training and review procedures can further minimise this risk.	
Recommendation 1/2013 Verve Energy: (a) Review the extent of operator access to the Kwinana Power Station Plant DCS system, with the objective of further minimising the risk of operational errors and potential accidents (b) Where appropriate, implement: • Focussed operator training • Review procedures, including the requirement for least two operators to sign off on changes in DCS procedures.	**Action Plan 1/2013** Verve Energy will: 1. Provide evidence of its review of the extent of operator access to the Kwinana Power Station Plant DCS system, with the objective of further minimising the risk of operational errors and potential accidents; 2. Where appropriate, implement focused operator training regarding the Kwinana Power Station Plant DCS system; and 3. Provide evidence of its review of procedures regarding the Kwinana Power Station Plant DCS system, including whether or not there should be a requirement for at least two operators to sign off on changes in DCS procedures. **Responsible Person:** Manager Portfolio Development & Optimisation **Target Date:** December 2013

Issue 2/2013

Asset maintenance: 6(b) Regular inspections are undertaken of asset performance and condition

A significant amount of forward planning for Kwinana Power Station assets had been affected by the uncertainty surrounding the plant closure/retirement date, which has only been clarified by a government decision in late June 2013 to retire the plant in 2015. A confirmed retirement date was critical for the optimum management of asset life to be aligned with the retirement date and for a thorough Optimum Maintenance Spend Plan to be produced.

The 2009 Engineering Risk Assessment Process assessment confirmed the planned critical risk reduction strategies such as improved engineering resources on site, replacing aging electrical components, etc. Although the extent of the improvement works undertaken to improve the condition of the plant is constrained by the official plant closure date of 2015, Verve Energy is expected to continue to manage the safety critical risks of thermal fatigue and corrosion type issues. Effective options for managing those risks are to implement Acoustic Leak Detection Systems and to minimise the 2-shifting operations of the plant.

As other planned risk reduction works are ongoing, the next ERAP assessment should clarify the residual risk profile of the plant.

Recommendation 2/2013	**Action Plan 2/2013**
In order to most effectively control thermal fatigue issues in Kwinana Power Station assets, Verve Energy consider: (a) Minimising two shift operations (b) Installing an acoustic leak detection system.	Verve Energy notes the June 2013 State Government decision to retire Kwinana Power Station Stage C from October 2015. Within this context Verve Energy will consider what options to most effectively control thermal fatigue issues in Kwinana Power Station assets are appropriate for the remainder of its life. This review will include consideration of the appropriateness of: • Minimising two shift operations; and • Installing an acoustic leak detection system. **Responsible Person:** Manager Portfolio Development & Optimisation **Target Date:** December 2013

Issue 3/2013 *Asset maintenance: 6(c) Maintenance plans (emergency, corrective and preventative) are documented and completed on schedule* In instances where recommendations are made by the detailed MetLab reports prepared as part of outage reporting, Verve Energy's processes provide for work orders to be raised to address those recommendations. As those processes do not provide a procedural link between the relevant recommendations and completed work orders, there is a minor improvement opportunity to more effectively track action taken to close out those recommendations.	
Recommendation 3/2013 Verve Energy implement a procedure to facilitate tracking of progress on recommendations in the outage closeout report by linking those recommendations with the consequent work orders raised.	**Action Plan 3/2013** Verve Energy will develop and implement a procedure to facilitate tracking of progress on recommendations in the outage close out report by linking those recommendations with the consequent work orders raised. **Responsible Person:** Manager Portfolio Development & Optimisation **Target Date:** December 2013

Issue 4/2013 *Review of AMS: 12 (a) A review process is in place to ensure that the asset management plan and the asset management system described therein are kept current* *12(b) Independent reviews (e.g. internal audit) are performed of the asset management system* Although components of Verve Energy's asset management system are subject to regular review and update, a formal process has not been established for ensuring the currency of the asset management system (including the currency of the collective references, which describe that system). There is also some doubt as to whether there has been any "substantial" change to Verve Energy's asset management system, which would warrant notification to the Authority per section 14(1)(b) of the Act.	
Recommendation 4/2013 Establish a formal review process for ensuring the currency of the asset management system, including the currency of the collective references, which describe that system. Such a formal process should also address the need for a sufficient degree of independence in that review.	**Action Plan 4/2013** Verve Energy will establish a formal review process for ensuring the currency of the asset management system, including the currency of the collective references, which describe that system. **Responsible Person:** Manager Portfolio Development & Optimisation **Target Date:** December 2013