

# Eden Energy Ltd (ASX: EDE)

An Emerging alternative energy market leader

29<sup>th</sup> September 2006

**Recommendation:** SPECULATIVE BUY

**GICS Industry Group:** ENERGY

## Capital Structure:

Share Price	A\$0.11
Fully paid ordinary Shares	122.4m
Options (listed 20c; 30/09/09)	86.9m
Options (unlisted ESOP 25c 30/08/09)	0.95m
Market Capitalisation - undiluted	A\$13.5m
Cash Position (30/06/06)	A\$7.0m
Share Price Year High-Low	A\$0.19 - 0.10

## Directors:

Executive Chairman	Greg H. Solomon
Non-Executive Director	Doug H. Solomon
Non-Executive Director	Guy T. Le Page
Non-Executive Director	Gregory J. Egan

## Top Five Shareholders:

	# Shares	%
Noble Energy Ltd	33.0m	27.0%
Top Energy Pty Ltd	25.8m	21.0%
Mr Gregory Egan	7.6m	6.2%
March Bells Pty Ltd	2.9m	2.4%
Arkenstone Pty Ltd	2.9m	2.4%

## Share Price History:



## Investment Highlights

### Hydrogen

- ❑ Eden's flagship is the Hythane® project, through its wholly owned "alternative energy" subsidiary Brehon Energy PLC. The company is proposing to tap into the transitional Hydrogen market via the introduction of Hythane®, a blend of Hydrogen and natural gas that lowers emissions by up to 50%;
- ❑ The Company has put together a world-class team of US based hydrogen employees and consultants, who have been involved in the development of all aspects of hydrogen technology over the past 50 years,
- ❑ Eden is in advanced discussions with several government agencies and engineering/energy companies in both China and India in respect to the roll-out of Hythane® and associated technologies;
- ❑ The Company is well advanced in its efforts to establish Hythane® as a preferred vehicle fuel for urban transit buses in many of the major cities in these markets as well as USA;
- ❑ The Company has signed MoU's to convert thousands of buses in 5 Chinese cities to operate on Hythane® and with the City of Barstow, California to create energy stations to supply hydrogen, natural gas and Hythane®;
- ❑ The Company is also developing a Cryogenic storage technology for the storage and transport of hydrogen in a liquid or supercritical state which is relevant to all applications from small tanks on motor vehicles;
- ❑ The Company has lodged patents and is aiming to develop and patent further strategic components in the hydrogen/Hythane® technology range such as cryogenic Hythane® using LNG and a portable superconducting energy storage device;

### Coal Seam/Coal Mine Methane and Natural Gas

- ❑ The Hydrogen Projects are complemented by coal seam/coal mine methane (50%) and a deeper natural gas projects (50-60%) in the South Wales (UK) coalfields – drilling to test the coal seam/mine potential is imminent;
- ❑ Eden also holds 100% of a natural gas play in SA (untested Seismic target);

### Geothermal Energy

- ❑ Eden has applied for eight geothermal licenses covering five targets in South Australia, including strategic tenements adjacent to projects held by Geodynamics Ltd;

## SUMMARY

Eden Energy has compiled a portfolio of conventional and alternative energy projects that cover the full supply chain from natural gas and geothermal energy production through to delivery and sales of hydrogen alternative fuels to the end-user. All the Company's projects are based on fuels that are at the clean end of the emission spectrum. In the current economic and political environment of high oil prices and fears over global warming, Eden has positioned itself to be a leader in the supply of alternative energy sources that will meet the most stringent regulatory hurdles. An investment in Eden Energy gives the investor pure exposure to an energy production and technology play.

**Disclosure of Interest-CORPORATIONS ACT s849**

In consideration for the preparation of this research report, RM Research Pty Ltd ("RMR"), RMR will receive a fee of A\$6,000.00. Representatives, Authorised Representatives and directors of RM Capital Pty Ltd and RM Research hold shares in Eden Energy Ltd. Mr Guy Le Page is a director of Eden Energy Ltd, RM Capital and RM Research.

**Know Your Client-CORPORATIONS ACT s851**

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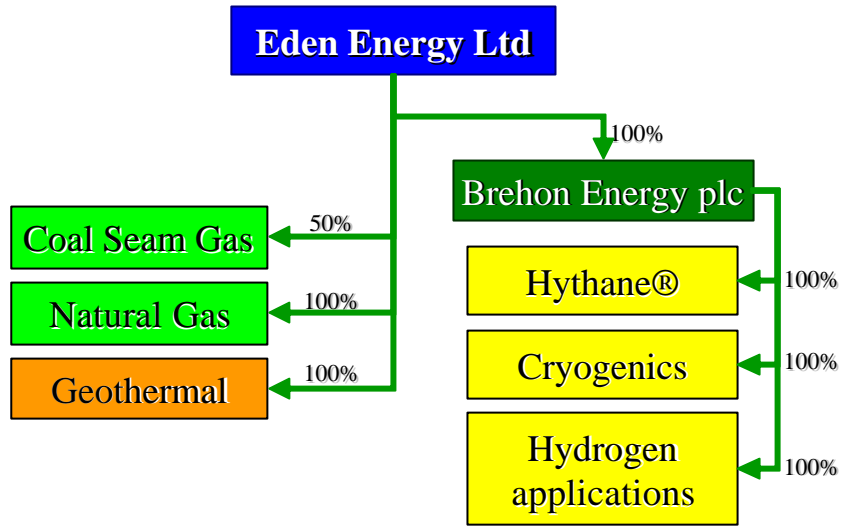
A world-class team of hydrogen industry professionals has been assembled

Hythane® reduces emissions of greenhouse gases by up to 50%

**Background**

Eden Energy Ltd ("Eden") listed on the Australian Stock Exchange on 6<sup>th</sup> June 2006 raising \$8.4m at 20c per share. Eden's corporate strategy is to become a major global participant in the alternative energy market through the development of patented hydrogen technologies held by its wholly owned subsidiary Brehon Energy plc. Eden's hydrogen technologies are complimented by a portfolio of coal bed/mine methane, natural gas and geothermal energy projects.

**Corporate Structure**



**Hydrogen Technology - Brehon Energy plc (Eden 100%)**

Brehon Energy plc ("Brehon") is developing technology and a range of patents in relation to the production, use and deployment of a low emission hydrogen/methane (natural gas) fuel mixture known as Hythane® for use as a fuel in motor vehicles and other internal combustion engines as well as the cryogenic storage of hydrogen. The Hythane® technology has been successfully trialled and is ready for commercialisation particularly in the expanding methane (or Compressed Natural Gas – "CNG") vehicle markets. Brehon has executed MoU's for the use of Hythane® in USA and China and is in advanced discussions in respect to sales with several substantial end-users in Europe.

Brehon has put together a world-class team of US based hydrogen employees and consultants, who have been involved in the development of all aspects of hydrogen technology over the past 50 years, particularly as part of NASA's space program.

**Hythane®** - The innovation and potential business success of the Hythane® technology was recently recognised by Brehon winning the 2006 CSIA Apex award for Best Use of Technology for Global Impact. This is one of the most senior awards bestowed in the US technology market.

Hythane® reduces emissions of NOx (the major contributor to photochemical smog) and other greenhouse gases by up to 50% compared with natural gas which itself is a relatively clean fuel. Low purity hydrogen which is available as a waste stream from a number of industrial processes, is suitable for use in

## Hythane® revenue model

- ❑ Margin on all Hythane® fuel
- ❑ Engine conversions
- ❑ Royalties
- ❑ Sales commission
- ❑ Regional franchise Fees

## Brehon's marketing progress...

### China

- ❑ MoU signed to convert thousands of buses in five Chinese cities to operate on Hythane®
- ❑ Demonstration Project – Q3 2006;
- ❑ Euro IV standards achieved on Chinese engine;
- ❑ Preliminary approval for Clean Air Program (16 cities).

### India

- ❑ Discussions underway with government & industry parties;
- ❑ Significant Government support- US\$25m funded;
- ❑ Blue Sky Program (9 cities).

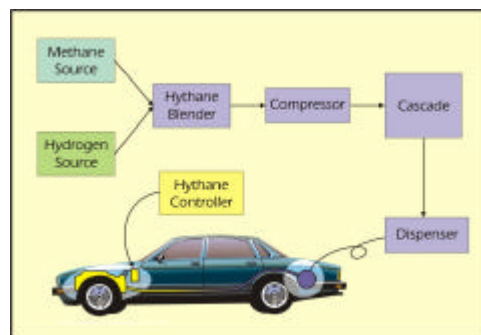
### USA

- ❑ US Department of Energy has awarded Brehon a grant of US\$2.1m for a long-term test of Hythane® and hydrogen fuelled engines
- ❑ MoU signed in the City of Barstow, California to create energy stations to supply hydrogen, natural gas and Hythane®

### Europe

- ❑ Application made for joint EU demonstration project

Cryogenic storage the key to solving the storage problems associated with hydrogen



Hythane® Operating System

Hythane®. This technology is of significant interest in the USA, China and India. The company is well advanced in its efforts to establish Hythane® as a preferred vehicle fuel for urban transit buses in many of the major cities in these markets, having recently again demonstrated the effectiveness of Hythane® by having completed a Hythane® conversion of a leading Chinese natural gas engine and reduced the emission levels to world leading standards.



Methane (CNG) and Hythane® bowsers

Brehon holds the US patent for Hythane® and has a range of other relevant Hythane® related patent applications including cryogenic Hythane®.

**Cryogenic Storage** - Brehon has identified the storage of hydrogen in a liquid or supercritical state (rather than as a compressed gas) as the key to solving the storage problems of compressed gaseous hydrogen. Brehon has retained the services of various cryogenic experts, most of whom were originally associated with the NASA space program that utilised liquid and supercritical hydrogen and oxygen as the primary rocket fuel. The cryogenic technology has broad application in other areas such as LNG, aerospace and scientific applications. Brehon has now established a cryogenic division, which is marketing a range of cryogenic products and, part from generating cash flow, will provide the platform for research and development of Brehon's emerging new cryogenic technology.

The Cryogenic storage technology is relevant to all applications from small tanks on motor vehicles, to large bulk storage on road has great potential in the many economies (particularly China and India) which will import large volumes of LNG as a primary energy source.

**New Hydrogen and Hythane® Technology** – Brehon has lodged patents and is aiming to develop and patent further strategic components in the hydrogen/Hythane® technology range such as cryogenic Hythane® using LNG.

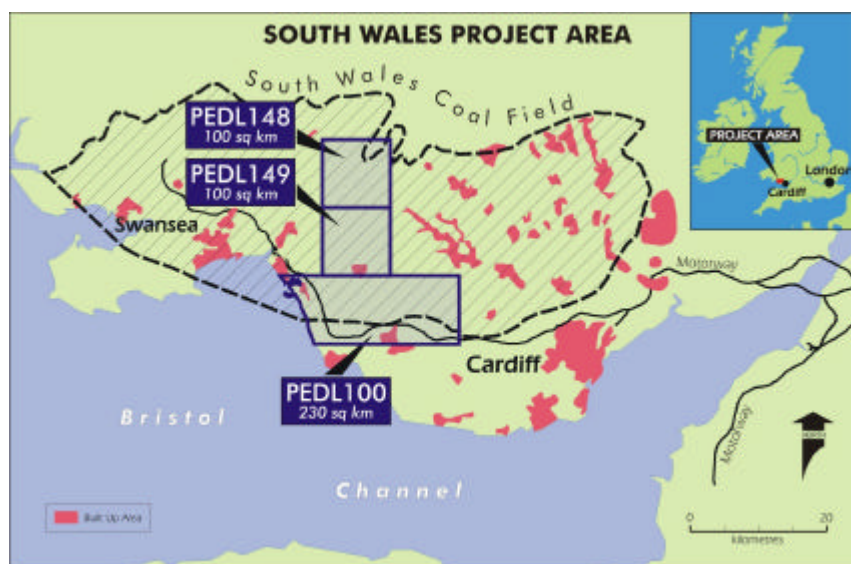
Brehon holds patents to a number of other hydrogen technologies with significant potential for successful commercialisation

**Portable Superconducting Energy Storage Device** – Brehon identified and has patented a new use of cryogenic storage devices by adapting them to functions as superconducting energy storage devices, with the potential to store many tens or hundreds of times more energy than the best available equivalent sized conventional batteries .

### **Coal Seam Gas - South Wales JV (Eden earning 50-60%)**

Eden has entered into three joint ventures with Welsh-based Coastal Oil and Gas Ltd and UK Methane Ltd. The first two of these farm-in agreements will give Eden the right to acquire a 50% interest in methane sourced from the 430km<sup>2</sup> area of three Petroleum Exploration and Development Licences (PEDL 100, 148 and 149). The PEDL's have potential to host methane as Coal Bed Methane ("CBM"), Coal Mine Methane ("CMM") and/or conventional gas reservoirs hosted by rocks of the Carboniferous Westphalian Measures of the South Wales coalfields.

The third farm-in agreement grants Eden the right to acquire a 50% interest (up to 60% if expenditure > £1 million) in a conventional oil/natural gas target hosted within Devonian-age sediments beneath the three permits .



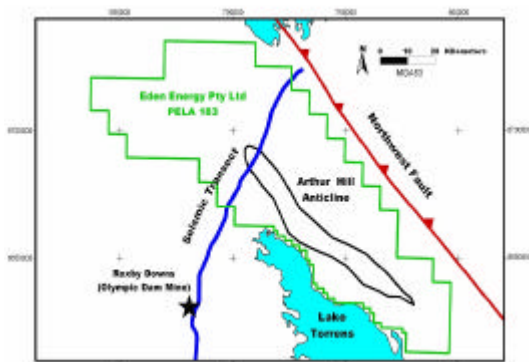
**Location of the South Wales project area and licences**

The South Wales coalfield contains the most extensive areas of high gas content coal seams in Britain, with gas problems leading to many mine closures in the district. Whilst intensive underground coal mining will have considerably reduced the gas resource in South Wales, there remain considerable areas of unmined coal with the potential to supply CBM. Only very limited assessment of CBM potential has been conducted to date. Studies predict that CBM from virgin wells on PEDL100 is likely to consist of about 95% to 98% methane.

Considerable potential exists for production of methane from abandoned mines . Whilst mines were operating gas was reticulated from the cross measures methane drainage to numerous commercial and industrial customers, demonstrating the quantities of gas available at the time. It is known from comprehensive British Coal records that there are extensive mine workings in the prospect area that, if still dry, are considered likely to contain significant quantities of CMM. No drilling has been undertaken to date to determine if these workings

Extensive mine workings in the prospect area are considered likely to contain significant quantities of CMM

Geological setting of the area is potentially an extension of the gas-rich Appalachian Trend of the eastern USA



**Location of the Arthur Hill Syncline project in South Australia**

“Bright spots” and “flat spots” in seismic reflection within the anticline data are potentially caused by gas pockets

have been flooded. Of significant commercial benefit is the fact that both old mine workings and unworked coal seams occur immediately under and/or adjacent to several large industrial plants and a major industrial estate that are all potential customers for any gas or electricity produced. Eden will test the potential of the coal seam/mine gas in a drilling program scheduled for the last quarter of 2006.

Relatively high concentrations of helium in the drained gas at some locations may be indicative of a conventional gas reservoir source in addition to coal seams. This may be either within the thicker sandstone units of the coal measures or possibly from deeper trap sites within the Devonian sediments underlying the South Wales Coal Measures.

Preliminary assessment of the PEDL100 region for conventional oil and gas prospectivity is encouraging. Available data is sparse, however the geological setting of the area is interpreted to be an extension of the gas-rich Appalachian Trend of the eastern USA.

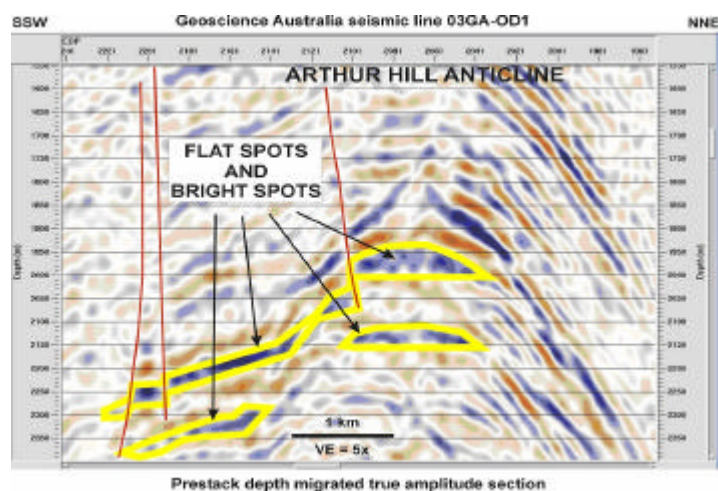
In summary, the South Wales area in general and PEDLs 100, 148 and 149 in particular show significant potential for conventional hydrocarbons, especially gas, though the exploration stage is early. A programme of acquiring all available data together with collecting and processing new broad seismic information and geological data will better define potential structural closures and narrow the focus for detailed seismic follow-up and possible drilling.

### Gas Exploration – South Australia (Eden: 100%)

The Arthur Hill Anticline, a large structure with dimensions of approximately 10km in width and 100km in length has been identified in South Australia from a seismic survey conducted by Geoscience Australia (an Australian Government agency). The anticline forms a conceptual Neoproterozoic gas exploration play. Oil and gas are produced from sedimentary deposits of similar age in Oman, eastern Siberia and southern China.

The Arthur Hill Anticline is a gentle fold interpreted to be comprised of Neoproterozoic sediments. It is located 50km to the north east of the BHPB Olympic Dam copper-gold-uranium mine which is a large potential market for any natural gas which may be discovered.

“Bright spots” and “flat spots” identified in seismic reflection within the anticline data at approximately 2,000m depth are potentially caused by gas pockets .



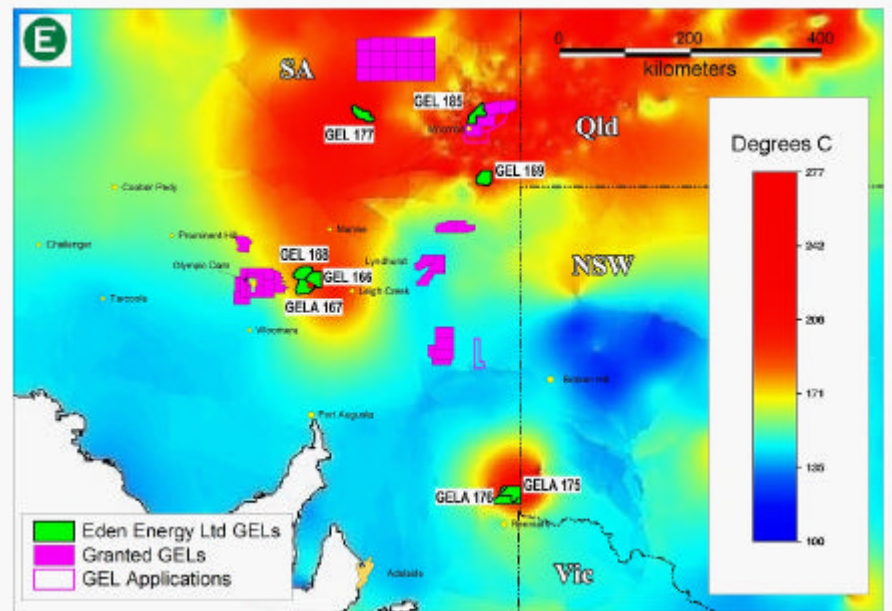
Eden Energy has applied for a Petroleum Exploration Permit of 7,614km<sup>2</sup> covering the anticline and its surrounds. When the licence is granted, drilling will be carried out to test the bright spot targets for natural gas. It is anticipated that Eden will look to drill this structure as soon as a suitable drilling rig can be located once the Petroleum Exploration Permit is granted. If this untested structure contains hydrocarbons, the inferred size could result in a significant hydrocarbon deposit.

### Geothermal Energy – South Australia (Eden 100%)

Eden has applied for eight geothermal licenses covering five targets in South Australia. Eden's geothermal programme is based upon the extraction of heat from hot, deeply buried rocks, or reservoirs by the injection and subsequent recovery of circulating hot water. Heat is recovered at surface via heat exchangers and used to generate electricity using turbines. The strategy requires locating a heat reservoir that is of sufficient size and temperature which is amenable to fracturing to enable fluid circulation through it and is located within reasonable proximity to infrastructure to enable commercial development.

### Geothermal Energy - "Deep Hot Rocks"

- Geothermal energy involves drilling holes (up to 4.5km) into hot rocks (eg granites). Heat is produced in the rocks themselves and also comes from deeper within the Earth's core.
- Hot rocks are fractured with high-pressure water to open up a network of cracks or existing natural fracture systems.
- Water is pumped down one borehole, travels through the fractured rocks, is heated and then recovered from other boreholes.
- The aim is to recover water at the highest possible temperature (at least 220°C) and pass it through a heat exchanger that generates electricity using turbines.
- In order for the target rocks to retain heat and be hot enough, a thick sedimentary "blanket" is needed.
- Central South Australia has all of the necessary requirements for this process.



**Location of Geothermal Exploration Licences in South Australia**

The temperature of the primary heat reservoir is critical. It depends upon the heat flow from deep levels within the earth's crust, the generation of additional heat from within the crust itself by the decay of radioactive minerals and the retention of heat in the reservoir by an overlying insulating blanket, ideally fine-grained sedimentary rocks up to three or four kilometres thick.

Eden has proposed a work programme for each project area for the next four to five years. Each is aimed at determining the suitability of the area for geothermal energy generation by a series of staged, technical and commercial investigations designed to minimise risk and expenditure during the work programme. Project areas that proved to be viable would ultimately require major funding for deep circulation wells, reservoir fracturing, power plants and infrastructure.

## MANAGEMENT TEAM

### **Frank Lynch**

Mr Lynch is a world expert in all aspects of hydrogen technology with over 35 years experience in hydrogen production, use, safety and storage. He has converted more than 60 different types of vehicles and engines to run on Natural Gas, hydrogen and Hythane® and was a co-inventor of Hythane®.

### **Dr. Tom Flynn**

Dr. Flynn has a PhD in Cryogenic Engineering and is the owner and founder of CRYOCO Inc., President of the National Cryogenic Engineering Association, and the author of cryogenic engineering textbooks.

### **Dr. Bob Rudland**

Dr. Rudland has created a career developing and designing systems for cryogenic and high temperature tanks, LNG fuelling stations for fleet vehicles, thermal, fluid and pressurisation systems and propulsion systems.

### **Dr. Glen McIntosh**

Dr. McIntosh has been active in the design of cryogenic equipment and management of low temperature technology since early 1953. His work has covered a significant portion of cryogenic engineering activity including thermal and mechanical design of Dewar's for helium, hydrogen, nitrogen, oxygen, argon, neon and methane.

### **Roger Marmaro**

Mr Marmaro, a co-inventor of Hythane®, has over 15 years experience in hydrogen and gas technology. His experience includes several years at Hydrogen Components Inc. developing Hythane®, and almost 10 years with BOC in various senior technical and marketing positions in USA working mainly with hydrogen.

### **Justin Fulton**

Mr Fulton has over 10 years experience as a senior combustion engineer specialising in hydrogen and other gas, including over 8 years with Woodward Governor Inc., a world leading US engine controller.

## DIRECTORS

### **Gregory Howard Solomon, Executive Chairman**

Mr Solomon is a solicitor with more than 30 years Australian and international experience in a wide range of areas including mining and energy law, commercial negotiation (including numerous mining, energy and exploration joint ventures) and corporate law. He has held numerous directorships of various Australian public companies since 1984 including several resources and technology companies. He is also the chair of Tasman Resources NL, Brehon Energy plc and a partner in the Western Australian legal firm Solomon Brothers.

### **Gregory Joseph Egan Executive Director**

Mr Egan attended the Graduate School of Applied Science and Business at New York University after completing a Bachelor of Arts degree in Fine Arts. He has over 25 years experience in all aspects of hydrogen program development, marketing and sales experience at various companies including Ergenics (INCO) and Supercritical Thermal Systems, and 10 years experience as marketing manager of Hydrogen Consulting Inc where Hythane® was developed and patented. During his career he has developed a range of cryogenic metal hybrid hydride alloys and other storage systems. He has also participated in the development of hydrogen liquefiers, storage systems and other devices for NASA. Mr Egan is also CEO of Brehon Energy plc, which is a wholly owned subsidiary of Eden and which develops and markets the hydrogen related technology.

### **Douglas Howard Solomon, Non-Executive Director**

Mr Solomon is a Barrister and Solicitor with more than 20 years experience in the areas of mining, corporate, commercial and property law and finance. He is a partner in the legal firm Solomon Brothers. Mr Solomon has advised a wide range of national and international companies on many transactions and has significant experience in both negotiation and dispute resolution. He has been a director of Eden Energy Ltd since the time of its incorporation in May 2004, and is also a director of Tasman Resources NL.

### **Guy Touzeau Le Page, Non-Executive Director**

Mr Le Page is a corporate adviser at RM Capital Pty Ltd specialising in resources. He is actively involved in a range of corporate initiatives from mergers and acquisitions, initial public offerings to valuations, consulting and corporate advisory roles. Mr Le Page was Head of Research at Morgan Stockbroking Limited (Perth) prior to joining Tolhurst Noall as a Corporate Adviser in July of 1998. Prior to entering the stockbroking industry he spent 10 years as an exploration and mining geologist in Australia, Canada and the United States. His experience spans gold and base metal exploration and mining geology and he has acted as a consultant to private and public companies.

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