# (HZR \$0.56) Speculative Buy - Initiation of Coverage



Analyst	Date	Price Target
Julian Lake	24 <sup>th</sup> October 2016	\$1.00/sh

## **Initiation of Coverage**

Hazer Group Ltd (Hazer) is commercialising the Hazer Process. The Hazer Process produces hydrogen gas and high purity graphite from methane (natural gas) with negligible carbon dioxide emissions. The co-production of graphite and the use of iron ore as a low cost catalyst distinguishes the Hazer process from incumbent hydrogen production technologies. Hazer owns the intellectual property rights to the technology which was developed at The University of Western Australia and is focused on scaling up the process to a commercial level

We believe as significant scale up and commercialisation milestones are demonstrated the market will impute significant value for the technology given its disruptive potential in large scale global markets. The global hydrogen market is worth \$100b+ annually and the graphite market worth ~\$14b+ annually. If successfully commercialised, Hazer will be able to supply both markets at a price point that is potentially disruptive to current suppliers.

#### **Valuation**

We initiate with a Speculative Buy recommendation and a price target of \$1.00/sh. We value Hazer at \$1.06/sh based on a net present value of the theoretical successful commercialisation of a single Hazer plant risk adjusted to 50%. We use Euroz estimates for operating costs and CAPEX, a 20 year operating life, a graphite basket price of US\$750/t, Hydrogen price of US\$ 1125/t, exchange rate of AUDUSD 0.75c. We do not include any valuation upside for the roll out of multiple Hazer plants but note that this would be significant should it occur.

#### Supportive commodity environment

Hazer's strategic focus on hydrogen and graphite is motivated by excellent market fundamentals which are supportive of new production. Graphite demand is forecast to rise strongly as demand for lithium ion batteries in electric vehicles and energy storage applications gain traction. Robust hydrogen demand is also supportive of new production driven by ammonia production and petroleum refining which combined account for over 90% of total hydrogen demand.

### Risks

An investment in Hazer is highly speculative. Hazer is subject to multiple risks including technology development/commercialisation risk, financial risk and the ability to access additional funding, operational risk and the dependence on key personnel.

Hazer Group Ltd	Year	Year Ended 30 June			
Share Price	0.56	A\$/sh			
Price Target	1.00	A\$/sh			
Valuation	1.06	A\$/sh			
Shares on issue	65	m, undiluted			
Options on issue	60	m			
Market Cap undil	uted 36	A\$m			
Enterprise Value	31	A\$m			
Debt	0	A\$m			
Cash	4.7	A\$m			
Turnover	284k	sh/day			
12 Mth Hi-Lo	0.85 - 0.20	cps			

Geoff Pocock	MD
Rick Hopkins	NE Chair
Bryant McLarty	NED
Danielle Lee	NED
Andrew Harris	NED
Andrew Cornejo	СТО

Shareholders	
Geoff Pocock	6.5%
Andrew Cornejo	5.8%

#### **Company Details**

**Dirctors & Management** 

Suite 7, 29 The Avenue Nedlands, Western Australia 6009 Telephone: +61 8 9389 7050 www.hazergroup.com.au

#### **Share Price Chart**



#### Disclosure

This analyst declares that he has a beneficial interest in Hazer Group Ltd.

Euroz Securities declares that it has acted as underwriter to and/or arranged an equity issue in and/or provided corporate advice to Hazer Group Ltd. during the last year. Euroz Securities has received a fee for these services.

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#### **Valuation**

We value Hazer at \$1.06/sh and set a price target of \$1.00/sh.

Our valuation is based on a risk adjusted NPV of a theoretical commercialised Hazer plant using internal Euroz estimates for operating costs, CAPEX and a assumed 20 year operating life. We use a graphite basket price of US\$750/t, Hydrogen price of US\$ 1125/t and exchange rate of AUDUSD 0.75c.

We apply a risk factor of 50% to the NPV based on development maturity. We envisage the risk adjustment reducing over time as key commercialisation milestones are achieved. Important commercialisation milestones include optimisation of process conditions, third party validation of graphite utility and design work and costings for the demonstration plant to be constructed in 2017.

We have used a long term graphite price assumption of US\$750/t FOB which we believe is conservative given current Low-High ranges evidenced in the market. Syrah Resources Ltd used a weighted average basket graphite price of US\$/t 1,000 FOB for its Balama Graphite Feasibility Study.

We have not included any value for the potential roll out of multiple Hazer plants which would substantially increase our valuation were this to occur.

Hazer Group Ltd - Euroz Valuation		
	A\$m	A\$/sh
NPV 10% of 80kt Hazer Plant risk adjusted 50%	107	0.87
Unpaid capital from options on issue	19.1	0.15
Debt	0.0	0.00
Cash	4.7	0.04
Total	131	1.06
Price Target		1.00





#### **Theoretical Hazer plant NPV**

Our estimates of the financial outcome of a Hazer process production facility are provided below.

Hazer process production facility - Euroz forecasts											
Year		-1	1	2	3	4	5	6	7	8	9
FX	AUD:USD		0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Graphite price	US\$/t		750	750	750	750	750	750	750	750	750
Hydrogen	US\$/t		1125	1125	1125	1125	1125	1125	1125	1125	1125
Hydrogen	tpa		20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
Graphite	tpa		60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000
Revenue	A\$/m		90	90	90	90	90	90	90	90	90
Operating Costs & Corp OH	A\$/m		-37	-37	-37	-37	-37	-37	-37	-37	-37
EBITDA	A\$/m		53	53	53	53	53	53	53	53	53
Depreciation	A\$/m		-7	-7	-7	-7	-7	-7	-7	-7	-7
EBIT	A\$/m		46	46	46	46	46	46	46	46	46
Capex	A\$/m	-100	-2	-2	-2	-2	-2	-2	-2	-2	-2
Pre-tax cashflow	A\$/m		51	51	51	51	51	51	51	51	51
Tax	A\$/m		-14	-14	-14	-14	-14	-14	-14	-14	-14
Post-tax cashflow	A\$/m	-100	37	37	37	37	37	37	37	37	37
Post tax NPV	A\$/m	217									
Post tax IRR	%	37%									

#### Euroz assumptions:

- CAPEX of \$100m AUD
- Sustaining CAPEX of \$2m pa
- 20 year production profile
- Straight line depreciation of assets over project life

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#### **Hazer Group Ltd**

The Hazer process enables the conversion of natural gas into hydrogen and high quality graphite. The research underpinning the technology was originally undertaken at the University of Western Australia before being assigned to the company in 2010. The company continued further development work which successfully demonstrated the use of iron ore as a low cost catalyst in the conversion process. The positive results to date culminated in the company listing on the ASX in December 2015 to provide further funds for scale up and commercialisation efforts.

#### Methane Cracking

Methane cracking (or the thermo-catalytic decomposition of methane) is a process that separates the hydrogen and carbon components of methane. The process has been studied since the 1960's as a method of producing hydrogen but has never been commercialised as it is cost prohibitive compared to incumbent hydrogen production processes. The reasons for this include:

- Use of high cost catalysts in the process usually nickel;
- Increased use of natural gas compared to competing hydrogen production processes; and
- · Lack of commercial market for graphite product stream.

If commercialised successfully, the Hazer process negates the above issues, offering significant cost and production advantages compared to incumbent hydrogen and graphite production methods.

#### The Hazer Process

The Hazer process utilises unprocessed iron as a low cost catalyst in a methane cracking reaction that converts natural gas into hydrogen and graphite. The process employs moderate temperatures (800-900c) and pressures (0-8 bar gauge) to split methane into its elemental components of hydrogen gas and solid carbon.



Source: Hazer Group Ltd

## Key Advantages of the Hazer Process

Pending successful scale up, the Hazer process will have significant advantages over incumbent hydrogen and graphite production methods including:

- Lower catalyst input costs;
- Lower operating costs;
- Lower CO2 emissions: and
- Ability to produce multiple graphite morphologies.

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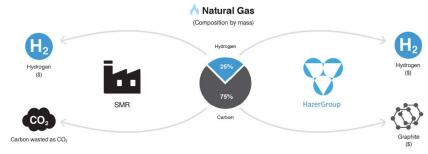
#### 1. Catalyst input cost advantage

The use of iron ore as a catalyst provides a significant cost advantage compared to methane cracking processes using a nickel based catalyst. Iron ore currently costs USD\$57/t while Nickel sells for above USD\$10,000/t.

#### 2. Lower operating costs

The use of low cost feedstocks, a low cost catalyst and the co-production of both hydrogen and a high grade synthetic graphite product, provides Hazer the opportunity to become highly cost competitive in the global graphite and hydrogen markets. The production of two valuable product streams significantly differentiates the Hazer Process from incumbent production methods.

Majority of the world's hydrogen is produced via Steam Methane Reforming. Under this process ~75% of the methane's mass is converted into waste CO2. Because the Hazer process produces hydrogen while also converting the carbon content of methane into saleable graphite, the revenue from the two product streams can potentially offset the cost of each other, placing Hazer favourably compared to incumbent production methods.

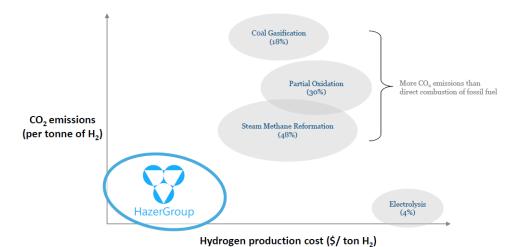


Source: Hazer Group Ltd

### 3. Low CO<sub>2</sub> emissions

Hydrogen produced by the Hazer Process occurs without the underlying coproduction of carbon dioxide from oxidation of hydrocarbon feedstocks. This significantly reduces the  $\mathrm{CO}_2$  emissions associated with the production process, offering a "clean" hydrogen product suitable for green energy applications.

## Hazer Process potential hydrogen production costs and CO<sub>2</sub> emissions



Source: Hazer Group Ltd

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Current incumbent hydrogen production methods produce significant amounts of carbon dioxide as a by-product of the production process. This has acted as a significant barrier to the adoption of hydrogen in clean energy production as while a hydrogen fuel cell may not produce CO2 emissions, the production of hydrogen is emission intensive and negates the positive impact. In the event of successful scale-up and commercialisation, the Hazer Process is well positioned to generate hydrogen to be used as a feedstock for clean energy generation.

Additionally, adding to the company's green credentials is Hazer's ability to further reduce CO2 emissions from the production process via using a portion of the hydrogen generated through the Hazer Process as reaction fuel for the generation of heat; the use of hydrogen as the heat source within the Hazer process eliminates CO2 emissions associated with the hydrogen production.

#### 4. Graphite morphologies

Hazer has produced graphite at 86% tgc (total graphite content) directly from the Hazer process under non optimised conditions. This product has been successfully upgraded via a single stage of chemical purification to produce a 99% tgc product. The use of low cost feedstocks and the single stage upgrading of product to 99%+ tgc places Hazer favourably to become a highly cost competitive player within in the premium graphite market.

Furthermore, a number of specialty graphite morphologies, with high crystallinity and purity have successfully been synthesized using the Hazer Process. These include Carbon Nano Onions, Carbon Nanotubes and Graphene. These products offer Hazer the opportunity to enter high-value niche markets within the greater global graphite market.

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#### **Technology ownership**

Hazer has 100% ownership of the Hazer Process technology and has not committed to any royalties or encumbrances, providing it with full discretion on how best to commercialise the technology. Commercialisation options include:

- Operating a plant itself and selling the end products;
- Licencing the technology to third parties and receiving a royalty; and
- Hybrid/agency model where capital/operating costs are shared and the partner has an interest in only one product stream.

Hazer has applied for 3 patent applications in various jurisdictions that cover key aspects of the Hazer Process including the use of iron ore as a low cost catalyst, aspects of the reaction process design that enable optimisation of the process and the ability to target various graphite morphologies via tailoring the reaction conditions to enable preferential synthesis of different graphite structures.

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#### **Commercialisation timeline**

Hazer's sole focus is on the technical and commercial development of the Hazer Process. The commercialisation path involves a number of distinct development phases and as these are met we believe the market will impute significant value for the technology given its disruptive potential in large scale global markets.

Key milestones to achieve commercialisation include:

- 1. Further scale-up of the methane cracking process via technical demonstrations at increasing levels of scale via:
  - a. large scale laboratory reactor and continuous flow reactor system;
  - b. demonstration/pilot plant; and
  - c. commercial scale plant.
- 2. Third party verification of graphite quality and utility in key market applications (graphite functionalisation).
- 3. A scoping study prepared by third party consultants for a full commercial plant (graphite commercialisation).
- 4. Preliminary indicative commercial arrangements or off-take agreements with graphite and hydrogen end users (product commercialisation)
- 5. Potential strategic partnerships with industry participants.

#### **Timeline of Key Commercialisation Milestones**

Calendar years	2016	2017	2018	2019
Large Lab Reactor				
Demonstration Plant				
Commercial scale plant				
Strategic partnerships				

Source: Euroz estimates

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#### **Risks**

#### Technology development and commercialisation risk

The development of the Hazer process is subject to a high level of commercialisation risk. The company has not yet demonstrated the process can be scaled up to commercial level. Further development work on scalability via large scale in-laboratory testing and pilot plant development will be required. The Hazer Process features production costs associated with increased natural gas consumption compared to other hydrogen production technologies. The Company will seek to more than offset this increase in production costs by the sale of high purity graphite co-produced with hydrogen from the Hazer Process. A failure to achieve commercialisation of the Hazer Process will have a significant adverse impact on the Company.

#### Financial risk and the ability to access additional funding

The Company is at a development stage and does not generate revenue. The Company will be dependent on the availability of investor funds until the Company generates cash flows from successful commercialisation of the technology. No assurance can be given that future funding for further development of the technology will be made available on acceptable terms (if at all). If the Company is unable to obtain additional financing as needed, it may be required to reduce the scope of its operations and scale back its development programs.

#### Key management risk

Hazer is led by MD Geoff Pocock and CTO Andrew Cornejo. Both Messrs Pocock and Cornejo have been instrumental to the Company's progress to date. Loss of key management may adversely impact the execution of Hazer's strategy and the commercialisation of its technology.

### Operational risk

The laboratory scale plant, demonstration plant, pilot plants and any commercial plant proposed by the Company may be affected by various factors, including operational and technical difficulties in scaling up the Hazer Process; difficulties in commissioning and operating plant and equipment; mechanical failure or plant breakdown; unanticipated reactor issues which may effect through-put; industrial and environmental accidents; industrial disputes; and unexpected shortages or increases in the costs of consumables, spare parts, plant and equipment.

#### Supply contracts/customer engagement

If commercialised, the group will require sales agreements for hydrogen and graphite offtake. There is no guaranteed the company will be able to procure such agreements on terms sufficiently attractive to ensure economic viability of the technology.

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#### **Directors**

#### Rich Hopkins - Non-Executive Chairman

Rick Hopkins is a Chartered Accountant with over 30 years of experience advising on corporate, taxation and accounting matters. Rick is currently a partner at PKF Lawler, having previously been a Director at Barringtons Chartered Accountants. He has vast experience advising on project management, corporate and taxation matters for a wide range of corporate clients. His particular expertise extends to corporate and structuring advice, capital raising, tax, and cash flow planning. He has worked on various committees of The Tax Institute and Chartered Accountants Australia and New Zealand.

#### Geoff Pocock - Managing Director

Geoff Pocock is an experienced strategy consultant and commercialisation professional, with over 20 years' experience across the commercialisation process. Geoff's experience has covered technical roles, executive management as well as significant corporate finance and strategy roles with a number of technology commercialisation ventures.

Geoff is the Principal of Polaris Consulting (WA) Pty Ltd, a specialist boutique commercialisation strategy and corporate advisory business based in Western Australia. Prior to founding Hazer, he was a founder and Managing Director of Dynamic Microbials Limited, an unlisted public drug discovery company working on the identification and development of novel antibiotics for specialist human health application. Geoff was an Executive Director/Managing Director of Dynamic from the Company's inception until the Company was acquired by its parent Phylogica Ltd in an all-scrip merger in 2008.

#### Andrew Harris - Non-Executive Director

Dr Andrew Harris is highly experienced in renewable energy, sustainability, biomimicry, nanotechnology, process engineering and the hydrogen energy economy. He is the lead Director of the Engineering Excellence Group within Laing O'Rourke's internal engineering and innovation team. Laing O'Rourke is one of the world's largest privately owned engineering and construction companies, with annual revenues of \$8 billion, 15,000 staff and operations in Europe, North America, the Middle East, Asia and Australia. The Engineering Excellence Group was established to be a global centre of excellence, to transform Laing O'Rourke's capabilities through strategic innovation, research and development, and enhanced technical performance.

Dr Harris is also Professor of Chemical and Bimolecular Engineering at the University of Sydney and co- director of the Laboratory for Sustainable Technology, the state of art laboratory where Hazer has established its core development activities for the Hazer Process. Dr Harris was the youngest ever professor of Chemical Engineering appointed at the University of Sydney.

Dr Harris was also previously the Chief Technology Officer of Zenogen Pty Ltd, a Sydney-based hydrogen production technology company, and was a co-founder of Oak Nano, a University of Sydney start-up commercialising novel carbon nanotube technology. Oak Nano designed and built the largest carbon nanotube production facility in the southern hemisphere.

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#### Danielle Lee - Non-Executive Director

Danielle is a corporate lawyer with more than 20 years' experience shared between private law firms and the Australian Securities Exchange (ASX). Danielle is currently special counsel at Jackson McDonald working in the corporate commercial team. Danielle's main practice areas are corporate advisory, governance and equity capital markets. Danielle advises on a range of corporate and commercial transactions including capital raisings, business and share acquisitions, shareholder agreements and joint venture arrangements. Danielle regularly advises on issues relating to the Corporations Act and ASX Listing Rules. Danielle was previously counsel for Fairweather Corporate Lawyers for approximately 7 years after having worked for approximately 9 years as legal counsel at ASX Sydney and Assistant Manager at ASX Perth.

#### Bryant Mclarty - Non-Executive Director

Bryant is the Executive Chairman of Mac Equity Partners, a boutique Western Australian stockbroking and corporate advisory business operating since 2009. Bryant has over 20 years' experience in public capital markets and raising capital for technology ventures. Bryant was the Executive Chairman of PharmAust Limited (ASX:PAA), during which time it provided highly specialised medicinal and synthetic chemistry services on a contract basis to clients. Bryant was also a Non-Executive Director of Avation PLC (LSE:AVAP), a specialist commercial passenger aircraft leasing company managing a fleet of 24 aircraft, from 2008 to 2013. Avation also has a subsidiary that supplies aircraft parts and spares to a range of operators internationally.





#### **Director Shareholdings**

Director Shareholdings	Shares	Options
Geoff Pocock	4,200,000	8,050,000
Rick Hopkins	800,010	1,500,003
Bryant McLarty	2,193,979	6,095,995
Danielle Lee	-	950,000
Andrew Harris*	-	1,150,000

<sup>\*</sup> Options subject to shareholder approval at AGM

### **Top 20 Shareholders**

	Shareholder	Shares (m)
1	Oofy Prosser Pty Ltd	3.70
2	Point At Infinity Pty Ltd	3.55
3	J P Morgan Nominees Australia Ltd	2.09
4	Mineral Resources Limited	2.00
5	The University Of Western Australia	1.67
6	Mr Paul Hartley Watts	1.50
7	Mr Bryant James Mclarty	1.35
8	Mr John Oakley Clinton	1.26
9	Kinetic Trade Pty Ltd	1.08
10	Mr John Oakley Clinton & Mrs Lilian Achieng Clinton	0.95
11	Mrs Helen Lewis	0.90
12	Jakana Pty Ltd	0.82
13	Mr Bryant James Mclarty	0.81
14	Mr Jason Paul Skinner	0.81
15	Cl Seward & Co Proprietary Ltd	0.80
16	Mr Nicholas Stuart Beaton Duncan	0.72
17	Mrs Claire Elizabeth Allen	0.69
18	National Nominees Limited	0.68
19	Mr Peter Howells	0.60
20	Zero Nominees Pty Ltd	0.56
	Total	26.52



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