



A one of a kind project

QEM's Julia Creek Vanadium and Energy Project (JCVEP) in Queensland is a unique project that promises to provide two commodities to the market that Australia requires but is reliant on foreign supply chains. Namely, high purity vanadium pentoxide (primarily for battery electrolyte) and transport fuel.

JCVEP has a Resource of 2,867Mt with an average V2O5 content of 0.31%, along with a contingent in-situ oil resource of 6.3MMbbls of oil equivalent in the 1C category, 49MMbbls in the 2C category, and 654MMbbls in the 3C category, all within the same orebody.

Building a local supply chain for vanadium and transport fuel

Vanadium is an important metal, used extensively in steel alloys and in batteries (specifically Vanadium Redox Flow Batteries (VFBs)). But with China and Russia controlling the world's supply chain, there is a need for Western sources of vanadium, although there is no domestic production of vanadium in Australia. As for transport fuel, over 90% of Australia's needs are imported in light of the closure of several refineries in recent years at the same time demand has continued to increase. Once in production, QEM plans to produce 10,571t of vanadium and 313M litres of fuel.

Progress has been made

QEM has been working hard to advance the project. In 2025, the company's work has included progressing beneficiation test work and taking the first steps to develop and Environmental Impact Statement and a Cultural Heritage Management Plan. During May 2025, the company raised \$2m in a strongly-supported placement. We expect QEM to continue to make progress for the rest of the year and for the company to advance toward a Prefeasibility Study. In particular, the company has slated an exploration program for Q3 and a JORC report for Q4.

Potential upside to \$0.24-0.35 per share

We reiterate our valuation of QEM at 7.4% of JCVEP's NPV. Our base case is our own modelling which derives an NPV of \$761.8m and would equate to \$0.24 per share under the current number of shares on issue. Using the original NPV of \$1,106m would derive \$0.35 per share. There may be further upside in certain scenarios including increased commodities and if QEM realises its ambitions to add an electrolyte production plant to the Project's scope are realised. Please see page 10 for more details on our valuation rationale and page 11 for the key risks to our thesis.

Share Price: A\$0.058

ASX: QEM

Sector: Resources

3 June 2025

Market cap. (A\$ m)	13.7
# shares outstanding (m)	236.4
# shares fully diluted (m) ¹	294.7
Market cap ful. dil. (A\$ m)	17.1
Free float	100%
52-week high/low (A\$)	0.165/0.032
Avg. 12M daily volume ('000)	103.8
Website	qldem.com.au

Source: Company, Pitt Street Research

¹ See Appendix I

Share price (A\$) and avg. daily volume (k, r.h.s.)



Source: Refinitiv Eikon, Pitt Street Research

Valuation metrics	
Valuation methodology	NPV
Our valuation of JCVEP (A\$m)	\$761.8
Our valuation of QEM (per share)	0.24
Discount rate	8%

Source: Pitt Street Research

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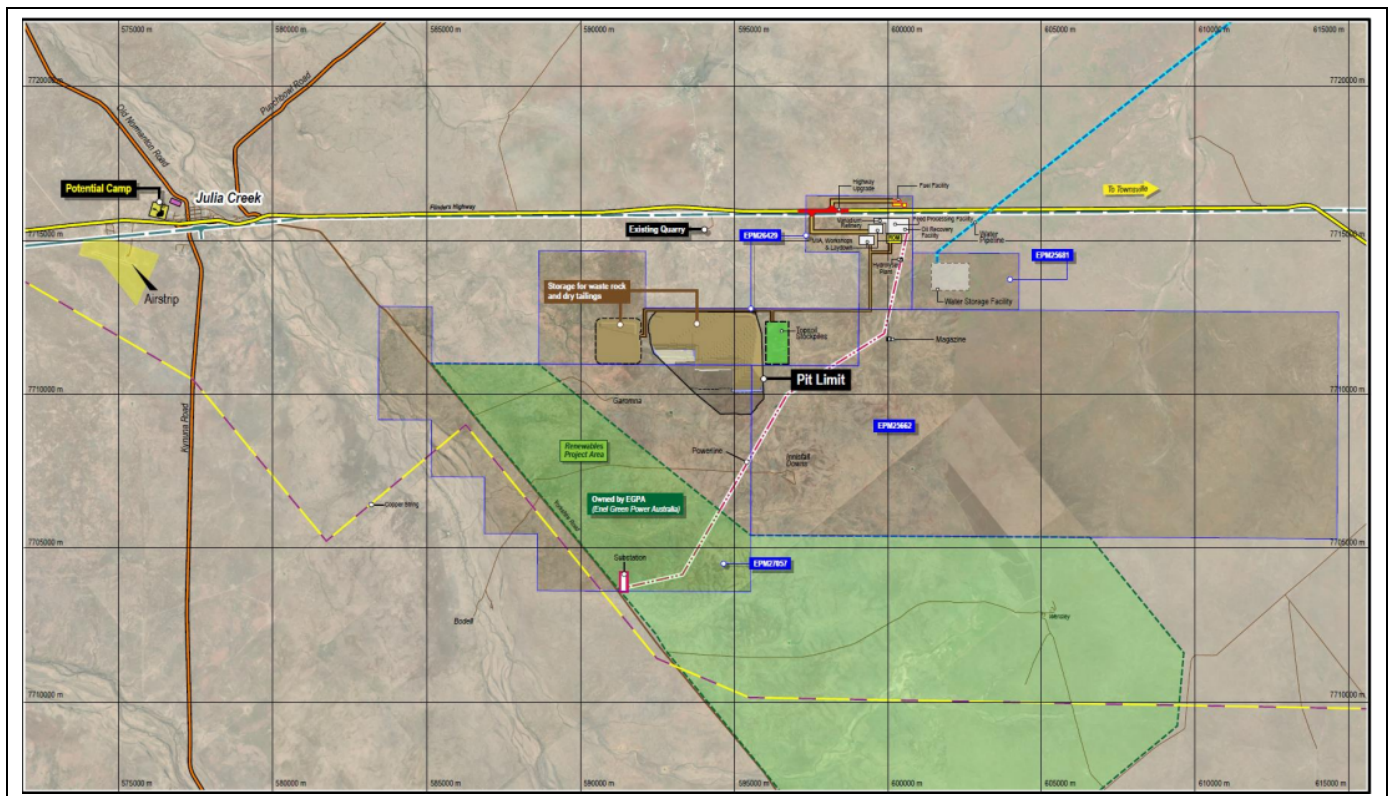


Recap of QEM and JCVEP

JCVEP will produce high purity vanadium pentoxide (for battery electrolyte) and transport fuel.

QEM is developing JCVEP, a project will produce high purity vanadium pentoxide (for battery electrolyte) and transport fuel. The project lies near the town of Julia Creek in Queensland, and it covers one of the single largest vanadium deposits in the world today, as well as a significant oil shale deposit. It covers 250km² including the project's pit, a vanadium refinery, an oil recovery and fuel processing facility, the area for renewable energy intended to power the project and a water storage facility (Figure 1).

Figure 1: JCVEP's location and outline



Source: Scoping Study into JCVEP, Company

JCVEP's most recent resource is 2,867 million tonnes at 0.31% V2O5 (vanadium pentoxide) along with a maiden 1C oil shale resource of 6.3 million barrels.

JCVEP's most recent resource, as outlined in its August 2024 feasibility study is 2,867 million tonnes at 0.31% V2O5, that is, vanadium pentoxide¹ (461 million tonnes indicated, 2,406 million tonnes inferred) along with a maiden SPE-PRMS² 1C oil shale resource of 6.3 million barrels (Figure 2). The 2C oil shale resource was 94 million barrels and the 3C estimate was 654 million barrels (Figure 3). The vanadium and the oil shale lie within the early Cretaceous Toolebuc Formation, a sedimentary unit increasingly recognised for elevated vanadium potential, with the vanadium and oil shale hosted by, and co-located within, this Formation.

¹ Another term for describing 'vanadium oxide'. It is a powder that is the most common source of vanadium.

² SPE-PRMS stands for Society of Petroleum Engineers - Petroleum Resources Management System. This is a standardised framework for managing petroleum resources, including classification, definitions, and guidelines for evaluating and reporting oil and gas reserves and resources.



Figure 2: Mineral Resource Estimate for JCVEP

Resource Class	Strata Unit	Mass (Mt)	Average Thickness (m)	In situ Density (gm/cc)	V2O5 (wt %)
Indicated	CQLA	167	3.17	2.4	0.24
	CQLB	128	2.58	2.28	0.30
	OSU	81	1.92	1.95	0.31
	OSL	84	2.02	1.95	0.32
	Sum	461		2.20	0.28
Inferred	CQLA	697	2.46	2.42	0.23
	CQLB	826	3.13	2.23	0.39
	OSU	432	1.84	1.97	0.31
	OSL	451	1.95	1.95	0.29
	Total	2,406		2.18	0.31
	TOTAL	2,870		2.19	0.31

Source: JCVEP Scoping Study, August 2024, p.5

Figure 3: Oil Resource Estimate for JCVEP

Resource Class	Strata Unit	Mass (Mt)	Average Thickness (m)	Total Moisture (wt%)	Oil Yield (L/t)	Oil Yield (LTOM)	MMbbls (in situ PIIP)	MMbbls Recoverable
3C Contingent	CQLB	903	2.5	6.8	53.1	55	254	228
	OSU	621	1.8	6.8	75.9	79	248	223
	OSL	609	1.9	6.8	70.7	76.7	224	202
2C Contingent	CQLB	107	2.1	2.8	50.9	52.3	33	29
	OSU	76	1.9	13.3	78.7	81.4	36	32
	OSL	81	2	11.8	74.8	76.7	36	33
1C Contingent	CQLB	7	1.9	2.8	49.0	49.6	1.9	1.8
	OSU	5	1.9	13.3	77.2	78.7	2.5	2.2
	OSL	6	2.1	11.6	74.6	76.2	2.6	2.3

Source: JCVEP Scoping Study, August 2024, p.5



Vanadium is a critical mineral, used prominently in steel alloys and Vanadium Redox Flow Batteries (VFBs).

The importance of vanadium

Vanadium is a 'very' critical mineral – formally designated such by many Western governments, including Australia and Queensland's State government. Vanadium's most common use is in steel alloys. These are used in several industrial applications including construction, automotive, aerospace, rail, shipping, tools and drill bits. There are other uses too including in chemicals, automotive manufacturing, smart glass windows, night vision goggles and crucially in batteries (specifically Vanadium Redox Flow Batteries (VFBs)).

Redox flow batteries (both those containing vanadium and those that do not) are essentially energy storage systems as are all batteries, but they are unique because they store energy in external electrolyte tanks which contain soluble redox couples. The term 'redox' is derived from the reduction and oxidation processes that take place which are the electrochemical reactions which occur during movement of electric charges and ultimately give us electricity.

VFB batteries are becoming increasingly popular because they produce less emissions than lithium batteries, are safer, more durable and have a long life cycle of up to 30 years- it can be discharged and recharged more than 100,000 times without any loss of performance and is fully recyclable – as well as more flexible being able to scale up or down to meet user requirements just by adding bigger tanks of electrolyte and then it can release power at whatever pace is required.

VFB's are regarded as Long Duration Energy Storage Systems (LDES), as they can provide power for longer duration of 8 hours+ and are well suited to Australian conditions. A number of global manufacturers of VFB's are now looking to manufacture here in Australia, including Rongke Power and Sumitomo Electric, who offer 30 year warranties on their product.

Vanadium is a metal where the world's supply chain is dominated by China and Russia, and there is a desire amongst Western nations to build its own supply chain. Australia is an ideal candidate because it has 31% of undeveloped global reserves, yet it has no domestic production at all. Global production of vanadium was US\$2.36bn, and the IMF believes demand will surge 8-fold over the next 25 years as the energy transition accelerates.

Liquid fuel will be important as well

Australia is also keen to develop its own fuel supply chain. Australia currently has just two refineries operating (Ampol's Lytton refinery and Viva's Geelong refinery) and imports over 90% of its fuel as refineries have closed at the same time demand has increased. It is arguable that the rise of electric vehicles could mitigate the need for fuel, but this still leaves the needs for diesel and aviation fuel unaddressed (any 'green alternatives' here are realistically multiple decades away). QEM plans to produce 313M litres of fuel produced and sell 5,550 bbl/day³, which equates to just under 4% of Queensland's annual diesel consumption.

³ The latter figure is exclusive of 7% of fuel production that will be provided free-issue to QEM's eventual mining contractor.



JCVEP is special

JCVEP does not necessarily need to stand out from the perspectives of lower costs or containing a large resource for it to play a part in Australia's requirements for vanadium. But the fact remains that there are no operating mines and Australia needs more. And JCVEP does stand out amongst vanadium deposits for several reasons including that JCVEP:

- Has compelling economic metrics including a post-tax NPV of over A\$1.1bn – as outlined below;
- Will produce 10,571t of vanadium annually as well as 313M litres of fuel,
- Has a relatively straightforward flowsheet,
- Is easy to mine as an open cut pit with a maximum depth of 65 metres and the bulk of the resource is very close to the surface,
- Will be powered entirely by renewables.

The Study placed a Net Present Value on the project of A\$1.1bn post tax at an 8% discount rate, after A\$791m in capital costs. The IRR is 16.3% and the payback period five years.

The August 2024 Scoping Study placed a Net Present Value on the project of A\$1.1bn post tax at an 8% discount rate, after A\$791m in capital costs. The IRR is 16.3% and the payback period five years. Significantly, the mineralisation in this Study is sourced from one open pit, with potential for a further 100 years of resource available within the current tenement boundary. The study used a V2O5 price of US\$11.56 per pound and a diesel sell price of A\$1.20 per litre (excluding excise and GST). It is QEM's intention to pursue further downstream opportunities by becoming a producer of the electrolyte for the VFB systems, which attracts a greater premium and could further enhance project economics (Figure 4, Figure 5 and Figure 6).

Figure 4: Results of the August 2024 Scoping Study (operations)

Metric	Unit	Result
ROM Ore Production Rate	Mt (dry)	5.1
ROM Ore Production Rate	Mt (wet)	5.3
Annual production (vanadium)	Tonnes	10,571
Annual production (fuel) ⁴	M Litres	313
Average transport fuel sold ⁵	Bbl/day	5,500
Opex (vanadium)	\$US/lb	5.80
Opex (fuel)	\$AU/L	0.59
Pre-production capex	\$A	\$1,096m
Sustaining capex	\$A	\$591m
Total capex (LOM)	\$A	\$1,694m
Plant feed quantities	dmt	148.4M
Strip ratio		5:1

Source: JCVEP Scoping Study, August 2024,

⁴ 7% of this will be provided free-issue to the mining contractor to undertake the mining work

⁵ Exclusive of the '7%' noted above



Figure 5: Results of the August 2024 Scoping Study (returns)

Metric	Unit	Result
Post-Tax NPV (8% discount rate)	AUD	\$1,106m
Payback Period	Years	5
IRR	%	16.3
ROM	Mt (dry)	5.1
Projected revenue LOM (vanadium)	\$A	\$11.5b
Projected revenue LOM (fuel)	\$A	\$10.1b

Source: JCVEP Scoping Study, August 2024

Figure 6: Results of the August 2024 Scoping Study (assumptions)

Metric	Unit	Result
Sensitivity	% (+/-)	15
Discount rate to cash flows	%	8
Vanadium pentoxide selling price	A\$/L	1.20
Transport fuel selling price	\$US/lb	11.56
Mine Life	Years	30

Source: JCVEP Scoping Study, August 2024,

The Queensland and federal governments have been supportive of the critical metals industry.

Extensive Australian government support

JCVEP and the vanadium industry has received extensive support, particularly from the Queensland government. JCVEP lies within an area designated as a Critical Minerals Zone and the project itself has been designated a 'Coordinated Project' which recognises the project's significance and establishes the environmental approval processes. The government has also given extensive funding to the industry including \$570m in funding for clean energy jobs as part of Queensland's Battery Energy Industry Strategy and establishing a \$100m Critical Minerals and Battery Energy Industry Strategy.

In addition, \$75m has been allocated to the Queensland Resources Common User Facility (QR-CUF) which is under construction in Townsville. This facility will allow for vanadium developers to test flow sheets at a larger scale. The Queensland government will further support with introduction of financiers and off-take partners.

The Queensland has also implemented a 3-year hiatus on tenement rental for critical mineral explorers in the State and QEM is a beneficiary of this rent relief package.

As for the federal government, its 2025-26 budget delivered substantial support to increase domestic green metals production. In particular, it legislated \$13.8bn in hydrogen and critical minerals production incentives and a \$2bn expansion of the Clean Energy Finance Corporation⁶. As a project that will be powered predominantly by renewables, we think the latter initiative could be important down the track.

⁶ <https://budget.gov.au/content/06-economy.htm>



The Albanese Government recently announced it will establish an Australian Critical Minerals Strategic Reserve.

The Reserve will build on extensive Australian Government investment in critical minerals through two new mechanisms:

1. National Offtake Agreements – through voluntary contractual arrangements the Government will acquire agreed volumes of critical minerals from commercial projects, or establish an option to purchase at a given price, holding security over these assets as part of the Strategic Reserve; and
2. Selective stockpiling: the Government will establish Australian stockpiles of certain key critical minerals produced under offtake agreements as required.

This initiative will greatly advantage critical minerals companies such as QEM.

US government support could be important too

Securing a Western-centric vanadium supply is a concern in the USA too. Even if QEM does not ultimately end up exporting any vanadium pentoxide to America, government support for vanadium could help momentum in vanadium prices and this benefit would flow through to QEM.

The US consumed 14,000 metric tonnes in 2024, but only 3,800 of this was domestically produced⁷. America's supply chain mostly comes from Brazil and South Africa, but even though these nations are hardly hostile to America, market conditions threaten such supply chains. Vanadium is important to the US because it is used in ballistic missiles, jet engines and airframes, night vision, armour steel, body armour, combat vehicles and other weapons systems that power America's national defence.

The Trump administration's approach to environmental and other regulations that stifle domestic production, could help the vanadium sector (and other critical metals developers as well). The administration is in its early days, but there are some positive early signs including its fast-tracking of approvals of Velvet-Wood, a Utah uranium and vanadium mine intended to be re-opened. Approvals of this nature ordinarily take a year, but it was promised on May 13 that the review would be completed in two weeks. The mine could recover 4 million tonnes of uranium and nearly 5 million tonnes of vanadium over its life⁸. This could bode well for similar projects.

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⁷ United States Geologic Survey (USGS) data

⁸ <https://www.nytimes.com/2025/05/12/climate/trump-velvet-wood-uranium-utah.html>



2025 has been a year of significant progress for QEM and it will continue to be

So far in 2025's QEM's achievements include:

- Progressing the beneficiation test work on the coquina run of mine samples in order to enhance the existing flowsheet,
- Working with the Queensland Office of Coordinator General (OCG) on a draft Terms of Reference that will set the requirements that the project must satisfy in preparing an Environmental Impact Statement,
- Commencing negotiations with the local Wanamara People to ultimately develop a Cultural Heritage Management Plan (CHMP) which is mandatory for any project requiring an environmental impact statement;
- \$2m Grant application due for submission to QIC in June,
- Exploration program mooted for June 2025 with JORC Report expected December,
- Development of concept design for vanadium electrolyte plant.
- Select engineering consultants for PFS.
- Conducting a round of environmental surface water and ground water surveys in order to provide an assessment of baseline groundwater and surface water conditions to support an EIS,
- Having external consultants complete an assessment of mine waste materials for the project, and
- Successfully being approved for a grant from the Collaborative Development Program.

In May 2025, QEM raised \$2.05m (before costs) in a Placement which was strongly supported. It also announced that Managing Director and CEO Gavin Loyden will retire at the end of FY25 (i.e. at the end of June) following over a decade of leadership, during which the company secured the asset and progressed it into a nationally significant critical minerals project. He will be replaced by Robert Cooper. Mr Cooper was most recently CEO of New Century Resources, and has over 30 years of experience in the resources sector.

QEM has made progress in 2025. The next big step for investors to look forward to will be a Preliminary Feasibility Study.

Beyond necessary environmental and heritage approvals, the next major step for the project will be undertaking a Preliminary Feasibility Study. The mere commencement of one will provide an indication that the company is progressing to production. The release of such a result – subject of course to the study showing similar (or better) metrics to the Scoping Study – will also be a key catalyst for the creation of shareholder value. Indeed, our valuation of QEM is only estimated to be feasible once such a study is out.

Nonetheless, even if it takes another year or two to reach that point, we expect multiple re-rating catalysts to occur including advancing all necessary approvals. We also expect the continued reduction in interest rates to aid the company's cause with investors as the ASX small cap market recovers.

In the more immediate term, QEM has told investors to expect an Exploration Program in Q3 and a JORC report in Q4.



We reiterate our valuation of QEM as outlined in our initiation report of 7.4% of JCVEP's NPV which is \$0.24 per share.

Our valuation of QEM & Julia Creek

We reiterate our valuation of QEM as outlined in our initiation report of 7.4% of JCVEP's NPV as determined by our own modelling of the project (of \$761.8m) and using a peer comparison of Richmond Vanadium Technology. Under the previous number of shares on issue this was \$0.30 per share but this is now \$0.24 per share in light of the increase in shares on issue.

We think this valuation is feasible once QEM has a Preliminary Feasibility Study out and has commenced a Definitive/Bankable Feasibility Study. Using the original \$1,106m valuation would derive a share price of \$0.35 per share.

Figure 7: NPV calculation

Valuation	Pitt Street	Scoping Study
Project NPV (A\$m)	761.8	1,106
%	7.42%	7.42%
Enterprise Value (A\$m)	56.5	82.1
Share outstanding (Diluted)	236.4	236.4
Implied price (A\$ cents)	0.24	0.35
Current price (A\$ cents)	0.058	0.058
Upside (%)	312%	499%

Estimate: Pitt Street Research

Our NPV of the project is A\$761.8m

Our A\$761.8m NPV is a discount to the NPV generated by QEM's Scoping Study. We encourage readers interested in more details to read our March 2025 initiation report. To briefly recap here, it assumes the company enters production in FY30 with the same production metrics regarding production, opex and capex as in the Scoping Study. It is reduced by the discounting on the cash flows that occurs by assuming production not to start until 5 years from now, as well as by accounting for repayment for debt over time.

Crucially this still represents significant upside from the current market capitalisation which is little over \$12m on a fully diluted basis. The NPV is also 24% higher than Richmond Vanadium's project. Under the current number of shares on issue, a market capitalisation of \$761.8m would be \$3.99 per share compared to the current share price of \$0.058 per share. Of course, the \$3.22 per share figure should *not* be taken literally because there will be significant equity dilution required to fund the project unless the company relied exclusively or almost exclusively (i.e. over 80% on debt financing), and we can only speculate on the exact financing mix the company will choose. Regardless of the mix of debt-equity, the price funding is raised at will play a significant part in shareholder dilution.

100% of NPV would represent \$3.22 per share under the current number of shares on issue, but this shouldn't be taken literally given significant dilution will eventuate.



Risks

We see the following key risks to our investment thesis:

- **Economic sensitivity risk:** The project's viability is subject to certain variables including the vanadium sale price (as we showed above), fuel prices and opex. Fluctuations as little as +/- 15% can have a significant impact, even if the project's NPV stats positive (Figure 8 – from the company's own estimates).

Figure 8: Outline of Julia Creek

Variable	Lower %	Upper %	Lower NPV (AUD million)	Upper NPV (AUD million)
Sale Price	85%	115%	343	1,847
Opex	115%	85%	462	1,732
Plant Recovery	95%	105%	837	1,356
Capital	115%	85%	909	1,285
Diesel for Mining Operations ^a	125%	75%	1,097	1,097

Source: Company

- **Regulatory risk.** QEM's ability to get Julia Creek into production is contingent on regulators providing all necessary approvals within timeframes anticipated. Any delays to this will stretch the company's timeline to get into production and hinder investor confidence. Without all necessary approvals, it is not getting into production
- **Finance risk.** The company will need significant capex (A\$791m) just to get into production. Obtaining finance on favourable terms, if at all, could be a challenge for the company.
- **Development risk.** There is the risk that the project may be delayed for several reasons, both within the company's control and out of its control.
- **Inflation risk:** There is the risk that cost blow-outs could result in more finance being needed for the project. Investors need only look at Lontown Resources (ASX:LTR) to see the impact that cost blow outs can have on a resources developer.
- **Key personnel risk:** There is the risk the company may lose key personnel and be unable to replace them and/or their contribution to the business.



Appendix I – QEM’s capital structure

Security Class	Number	% of total
Shares issued prior to placement	190,833,688	
Shares issued in May 2025 placement	45,555,556	
Total Ordinary shares	236,389,244	80.2%
Options	54,164,033	18.4%
Performance rights	4,125,000	1.4%
Total	294,678,277	

Source: Company

Appendix II - Analysts’ Qualifications

Stuart Roberts, lead analyst on this report, has been an equities analyst since 2002.

- Stuart obtained a Master of Applied Finance and Investment from the Securities Institute of Australia in 2002. Previously, from the Securities Institute of Australia, he obtained a Certificate of Financial Markets (1994) and a Graduate Diploma in Finance and Investment (1999).
- Stuart joined Southern Cross Equities as an equities analyst in April 2001. From February 2002 to July 2013, his research speciality at Southern Cross Equities and its acquirer, Bell Potter Securities, was Healthcare and Biotechnology. During this time, he covered a variety of established healthcare companies, such as CSL, Cochlear and Resmed, as well as numerous emerging companies. Stuart was a Healthcare and Biotechnology analyst at Baillieu Holst from October 2013 to January 2015.
- After 15 months over 2015–2016 doing Investor Relations for two ASX-listed cancer drug developers, Stuart founded NDF Research in May 2016 to provide issuer-sponsored equity research on ASX-listed Life Sciences companies.
- In July 2016, with Marc Kennis, Stuart co-founded Pitt Street Research Pty Ltd, which provides issuer-sponsored research on ASX-listed companies across the entire market, including Life Sciences companies.
- Since 2018, Stuart has led Pitt Street Research’s Resources Sector franchise, spearheading research on both mining and energy companies.

Nick Sundich is an equities research analyst at Pitt Street Research.

- Nick obtained a Bachelor of Commerce/Bachelor of Arts from the University of Sydney in 2018 and the designation of Financial Modelling & Valuation Analyst by the Corporate Finance Institute. He has also completed the CFA Investment Foundations program.
- He joined Pitt Street Research in January 2022. Previously he worked for over three years as a financial journalist at Stockhead.
- While at university, he worked for a handful of corporate advisory firms

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