PITT STREET RESEARCH

MTM Critical Metals

A potential beneficiary from Trump's tariffs

Share Price: A$0.205

ASX: MTM

Sector: Resources

15 April 2025

MTM Critical Metals (ASX: MTM) is a company commercialising a Flash Joule Heating (FJH) technology. The technology can make a significant difference in the recovery of metals. FJH can recover metals with a lower cost (in terms of time and money), lower energy consumption and thus lower environmental impact and lower reagents. It could also enable US metals companies to 'onshore' their processing.

More commercial collaborations

MTM has taken several pivotal steps towards eventual production including signing its first commercial collaboration with Indium Corporation, and letters of intent with US e-waste recycling companies Dynamic Lifestyle Innovations and Plastic Recycling to supply e-waste feedstock to MTM. The new agreements have come off the back of MTM's most recent testing results that have reported exceptional results which we will outline in this report.

The key catalyst for MTM will be the planned commissioning of its US demonstration plant. This is anticipated in the December quarter of 2025 and will be key in securing further commercial partners.

FJH: A domestic critical metals solution

Even prior to the Trump administration's tariffs, the push to onshore domestic processing and refining of critical metals was real – it has only been magnified in recent weeks. MTM's FJH bypasses US import duties (and Chinese export restrictions on critical metals) as it sources feedstock from US partners. Moreover, the US government is issuing billions of dollars in grants for local critical minerals projects. MTM is therefore poised to benefit as American companies requiring critical minerals seek domestic supply solutions that will hold up in this brave new world.

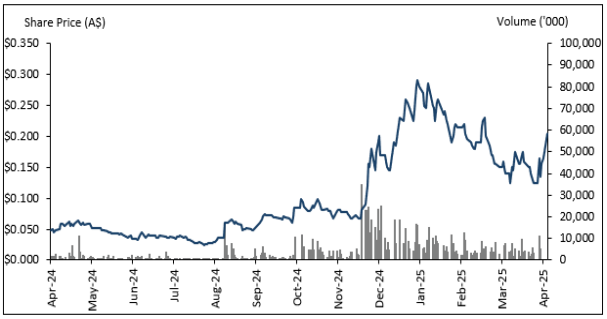
Valuation $260.7m or $0.57 per share

We reiterate our valuation of MTM of $260.7m, or $0.57 per share under the current number of shares on issue. This is a peer-weighted approach and was last updated in our previous report in January. Please see page 7 for more details on our valuation rationale and page 8 for the key risks.

Market cap. (A$ m)	94.0
# shares outstanding (m)	458.7
# shares fully diluted (m)	554.2
Market cap ful. dil. (A$ m)	113.6
Free float	100%
52-week high/low (A$)	0.29 / 0.024
Avg. 12M daily volume ('1000)	4,154.1
Website	mtmcriticalmetals.com.au

Source: Company, Pitt Street Research

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



Source: Refinitiv Eikon, Pitt Street Research

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Disclosure: Pitt Street Research directors own shares in MTM.

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Re-cap of MTM Critical Metals (ASX: MTM) and its FJH technology

MTM Critical Metals is a company that first listed on the ASX as gold explorer Mt Monger Resources but got into FJH technology in late 2023 when it acquired Flash Metals Pty Ltd which had REE-prospective territory adjacent to WA1 Resources (ASX: WA1) along an option to license the FJH technology. MTM has been almost exclusively focused on FJH since then as it has seen the potential of the technology. In this section we will outline the general benefits of FJH that hold in all geopolitical circumstances, the proven utility of the technology and the potential FJH offers to help the 'Westernisation' of critical mineral supply chains.

What's the big deal about FJH?

Joule heating is a way of producing heat through the collision of electrons in the conductor, and FJH is joule heating done at a 'flash' pace.

FJH generally is a scientific concept - MTM only has licensed a type of FJH from Rice University. Joule heating is a way of producing heat (thermal energy) through the collision of electrons in the conductor and 'Flash' Joule Heating is this phenomenon done at a 'flash' pace (i.e. less than a second). The FJH developed by Rice University developed from attempts to make 'flash graphene' and the discovery by scientists that the process could enable ultrafast heating. Applying FJH to metal recovery enables an easier process as FJH makes metal recovery:

- **Less time consuming** (from multiple hours to mere milliseconds),
- **Less reagent-intensive** (meaning less compounds which cause necessary chemical reactions will be needed),
- **Less environmentally damaging** by using less acidic waste,
- **Selective** (meaning only the metal of interest will be recovered and recycled), and
- As a result of all of the above **less expensive and energy intensive**. Pyrometallurgical processes consumer 1,000-2,000kWh per tonne of E-waste due to prolonged heating.

In addition to these general benefits, FJH can also overcome certain problems with specific commodities. Considering rare earths for instance, FJH could remove the need for the 'acid bake/roasting' step. With respect to lithium, FJH could replace the 'calcining' process whereby alpha-spodumene is converted to leachable beta-spodumene. These benefits specific to these (and other) target commodities are outlined in greater detail in our October 2024 initiation report.

FJH could theoretically be used both in the processing of new materials and the recycling of old materials (such as e-waste which is a particular focus of MTM). However, it is predominantly the latter where the company is focused because this is a more lucrative proposition for all parties involved, given the abundant opportunity for metals recovery. PCBs (Printed Circuit Boards), the laminated structure in electronic devices that hold and electrically connect all the components, tend to contain 100x more gold than mined ore at gold mines. Compare this to the time, monetary and environmental costs of discovering, constructing and operating a new mine and it is a no-brainer to source recycled metals using a technology like FJH.

Typical PCBs in electronic devices tend to contain 100x more gold than mined ore at gold mines.

Does FJH really work?

MTM's FJH has shown spectacular testing results consistently across various types of metals.

MTM has conducted its own testing on FJH to see if the theory was borne out in reality, and the answer has not just been resoundingly affirmative but even more so than the company had previously anticipated. Results of testing in May 2024, done at 50 times the scale of Rice University's original proof of concept, was 50% higher in 2022. FJH improves the acid leachability of REEs by over 50% and other critical metals by 50-514% when compared to conventional acid leach methods. In September 2024, MTM announced that it had successfully used FJH to recover gold from e-waste and achieved yields of up to 70%. In February 2025, MTM demonstrated ~90% and ~80% recovery rates for Gallium and Germanium respectively from semiconductor metal refining waste.

MTM's most recent testing results were revealed to shareholders in early April 2025, conducted on Printed Circuit Board Feedstock (from end of life electronics), and depicted over 95% recovery for gold & titanium and over 90% for silver, tin and zinc (Figure 1 and Figure 2). These not only show that FJH technology works, but also that e-Waste is an ideal opportunity to source recycled metals.

Figure 1: MTM's testing results with e-waste

Element	Feedstock Grade	Recovery to Chloride (%)
Gold (Au)	551 g/t	100%
Silver (Ag)	2,804 g/t	97%
Copper (Cu)	41.60%	91%
Tin (Sn)	13.20%	97%
Aluminium (Al)	5.20%	91%
Zinc (Zn)	1.30%	99%
Nickel (Ni)	1.40%	81%
Titanium (Ti)	0.20%	100%

Source: Company

Figure 2: Original E-waste printed circuit board waste and metal rich char (E-waste with plastics removed)

Source: Company

MTM's FJH could help with the USA's push to onshore critical metals production

The push to onshore domestic production of critical metals was underway long before the recent 'Trump tariffs'.

The trade war begun by the Trump administration has bought to the forefront of the minds of companies and investors the need for a domestic critical metals supply chain. In reality, this push was well underway for certain metals even prior to the Trump administration, as the US and other Western countries established lists of critical minerals. Although the exact lists differ from country to country, many of them share metals where FJH has been shown to have an impact including graphite, zinc, lithium, certain REEs (Rare Earth Elements), Gallium and Germanium[1].

With China responsible for a significant proportion of the world's supply chain for many of these metals, designating these materials as critical and subsequently offering initiatives such as grants to projects for these metals was an attempt to encourage the development of a Western supply chain for these metals. But in many of these, recycling could be the only option – most pertinently because of a lack of mineral projects or mines, but also because some can only be found as a by-product of other minerals. Germanium for instance is only found as a by-product of zinc ore and coal fly-ashes[2]. A major wake-up call for companies requiring Germanium came in July 2023 when China announced export controls on germanium, requiring a specific export license for *every* single shipment of germanium. This resulted in exports coming to a virtual standstill for a couple of months. Even when exports resumed, China was much faster to approve exports to more favourable jurisdictions with over 40% of exports being shipped to Russia and Hong Kong.

[1] All of these are designated critical minerals in the USA.
[2] For more information on germanium and its occurance, please see our 28 November 2024 report on Battery Age Minerals (ASX:BM8)

As a company that will source its feedstock almost entirely domestically, MTM's FJH should be able to bypass the tariffs altogether

The Trump administration's tariffs have only magnified this need for Western supply chains. Notwithstanding the 3-month 'pause' implemented for most tariffs, there is still a 10% baseline tariff on all imports and up to 125% for all Chinese-origin goods. The importing of critical minerals, at least from China, was an uncommercial prospect even prior to tariffs. But these tariffs increase the appeal of MTM's FJH technology (Figure 3). As a company that will source its feedstock almost entirely domestically (with potentially some from allied sources), MTM's FJH should be able to bypass the tariffs altogether. Beyond being a tariff hedge for customers, MTM could also be a target for government procurement and incentives including Department of Defence (DoD) and Department of Energy (DoE) grants.

MTM has already initiated engagement with the DoD and DoE to seek non-dilutive funding support for scaling FJH. These efforts align with U.S. policy objectives to reshore critical mineral processing and support technologies that enhance national supply chain resilience.

Figure 3: MTM's tariff risk exposure vs import-based models

Feedstock Type / Source	MTM (Urban Mining / Domestic U.S.	Import-Based Competitor (China-Origin / Foreign)
Gallium, Germanium, Indium	Low — sourced from Indium Corp (U.S.)	High — up to 125% tariffs & export controls
Rare Earth Elements (REEs)	Medium — mix of U.S. / allied sources	High — dominated by China
Gold, Copper, Tin (e-waste)	Low — recovered from domestic U.S. e-scrap	N/A or Low — typically low or zero tariffs
Supply Chain Control	Low Risk — fully domestic U.S. / controlled	High Risk — geopolitical/trade shocks
Eligibility for U.S. Incentives	High — meets domestic U.S. content rules	Low — foreign content may disqualify
Price Volatility	Low — stable, domestic U.S. sources	High — tariff shocks, FX volatility

Source: Company

MTM's road to commercialisation

MTM's focus for commercialisation involves finding external partners which could become customers, and building a demonstration plant in Texas.

MTM's focus for eventual commercialisation is two-fold. The first is finding external partners that could become customers eventually and the second is building up its capabilities. To the latter end, it is building up a demonstration plant in Texas, capable of 1 tonne per day, that is expected to be in production by the end of 2025. And in respect of the former, the company now has three external partners.

MTM's external partners

Since its collaboration with Indium, MTM has secured agreements with Vedanta, Dynamic Lifecycle Innovations and Plastic Recycling.

In December 2024, MTM signed a strategic collaboration with Indium Corporation, the first external deal of its kind that the company had secured. Indium is one of the Western world's leading suppliers of refined gallium, germanium, indium and other specialty technology metals. MTM will process scrap materials rich in gallium, germanium, indium and tin provided by Indium. The companies intend to create a US-based processing solution to recover those metals from scrap sources, and thus play a part in securing a US supply of critical materials.

Since its collaboration with Indium, MTM has secured agreements with Vedanta, Dynamic Lifecycle Innovations and Plastic Recycling. The first is an early-stage opportunity for further testing of FJH that could open up an entirely new market segment in the future, while the latter two are agreements for feedstock (i.e. the raw material to be processed to recover critical metals).

Vedanta: An opportunity in Red Mud

In March, MTM signed a non-binding MOU with global metals conglomerate Vedanta. It is a powerhouse in aluminium, zinc, copper and energy. The companies signed an MoU to apply MTM's FJH to Red Mud (RM) recycling. Vedanta will commit to supplying Red Mud (bauxite residue) from its alumina operations to MTM, and MTM will apply FJH to extract materials. It is estimated that over 140 million tonnes of Red Mud is generated worldwide (1.2-2 tonnes for ever tonne of aluminium produced), and this contains up to 50% iron oxides along with 1.2 billion tonnes of alumina, 690 million tonnes of titanium and 690,000 tonnes of gallium. FJH offers potential to recycle these metals to an extent it is current uneconomical to do right now.

The MoU followed testing conducted at MTM's lab, processing Red Mud residue (Figure 4). The process successfully reduced the iron content of the raw feedstock and optimised the chemistry and colour so that it could potentially be used as a green cement. It also would enable the extraction of high-value residual metals in further processing. MTM will focus on optimising FJH for this next step.

Figure 4: Results of FJH treatment on red mud samples

Source: Company

Dynamic Lifecycle Innovations and Plastic Recycling: An opportunity in E-waste

MTM signed two further external partnerships in April 2025. The first was a feed-stock agreement with US-based e-waste recycling company Dynamic Lifecycle Innovations (DLI). The parties have signed a Letter of Intent outlining the principal terms for a long-term e-waste supply agreement which is intended to become binding at the signing of such a supply agreement. There will be a target annual volume of ~800 tonnes of PCB (Printed Circuit Board)-rich e-waste material, with a firm Minimum Annual Volume commitment of 700 tonnes (which is exclusive). This equates to an average of approximately 65-70 tonnes per month. The initial term is for 5 years, starting in the December quarter of 2024 and is extendable for additional 5-year terms by mutual written agreement.

The agreements Vedanta, Dynamic Lifecycle Innovations and Plastic Recycling bring MTM's total guaranteed feedstock for 1,100t/year.

Only two days after the DLI agreement was revealed, MTM secured a second 5-year e-scrap supply agreement with Plastic Recycling. This agreement is for 400/t per year, bringing the total guaranteed feedstock to 1,100 t/year. This too is only a Letter of Intent but is expected to become a binding contract within the coming weeks. The price is indexed to the Scrap Register or equivalent pricing, adjusted for actual assay results.

The market opportunity in the US, and abroad

The global E-waste market is expected to be quadruple 2022 levels by 2032.

With the DLI, Plastic Recycling and Indium agreements, it is clear that procuring metal from scrap derived from electronics (E-Waste) will be the focus of MTM in the immediate future. The global E-waste market was US$57.8bn in 2022 and has been predicted to reach US$244.6bn by 2032, representing a 15.7% CAGR and a quadrupling over a decade[3]. But this lucrative opportunity of this market is not just by its size in dollars but because of:

- The amount of metal waste produced annually (with 62 billion kg of e-waste which is 7.8kg per capita[4] - 34 billion is e-waste, of which 5 billion comes from small IT equipment such as laptops and phones globally[5]),
- How quickly the amount of e-waste is growing (by 2.3 billion kg since 2010),
- The ever-increasing value of recoverable materials ($62bn in 2022),
- The very low proportion of e-waste that is currently recycled (~25% in the US and 15% globally),
- How the proportion of e-waste recycled is set to increase due to commercial imperative (particularly the lack of new mines to supply the metals coming online in the short to medium term) and in some jurisdictions the law. One example is the EU which has implemented the Critical Raw Materials Act and WEEE Directive intending 4kg per capita recycling annually. A total of 81 countries have e-waste policies, legislation or regulation, 37 of which have specific e-waste recycling rates.

This indicates that there is significant room for a solution such as MTM's FJH. Even if MTM only captures a small share of the market, there is a significant opportunity.

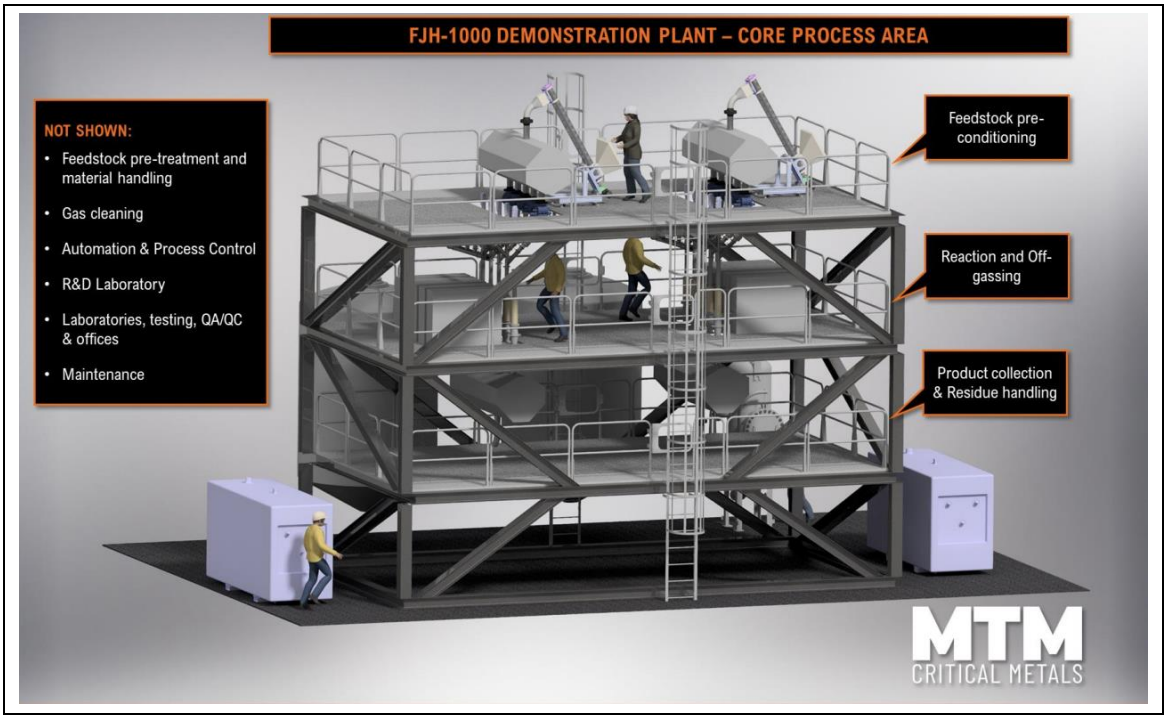
[3] Allied Market Research 2023.
[4] United Nations' 2024 Global E-Waste Monitor;
[5] 11 billion pounds

What the rest of 2025 holds for MTM

MTM is aiming to begin operations by the end of 2025 and is currently on-track.

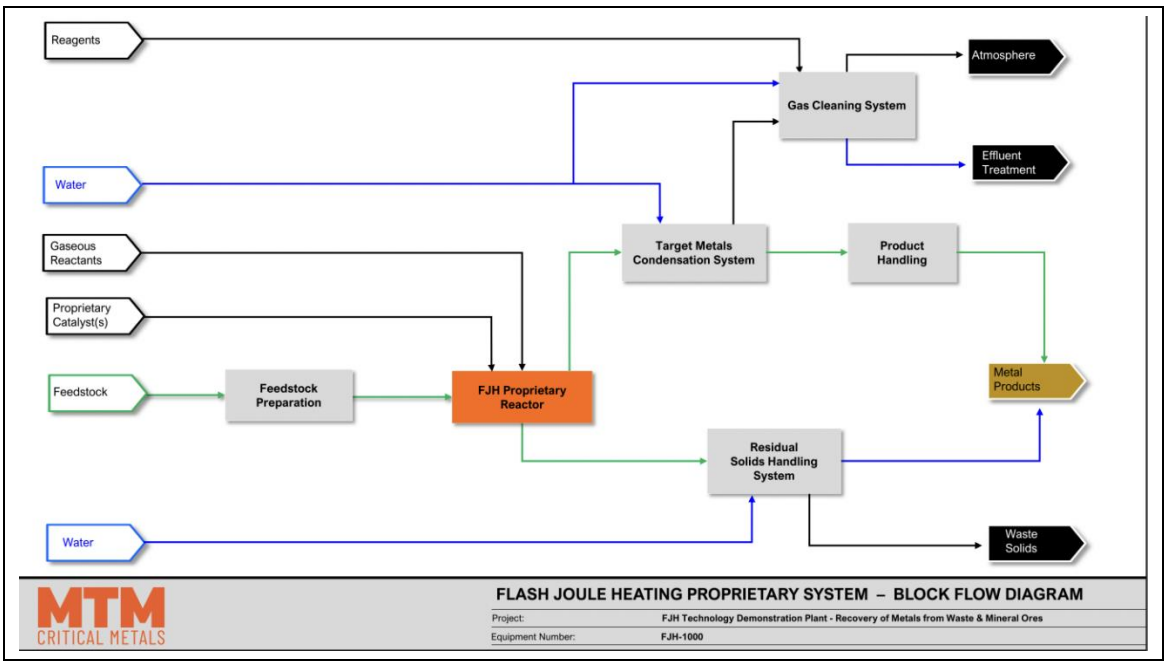
MTM's key focus for 2025 is its proposed demonstration plant (Figure 5 and Figure 6). As of early April 2025, the company finalised the process design including the key process parameters (flow rates, material balances and operating conditions), final equipment selection and regulatory readiness. The company's next step is to secure a pre-permitted site in Texas (or a neighbouring state) and obtain necessary approvals. The company is aiming to begin operations by the end of 2025 and is currently on-track. By this time, it hopes to have finalised initial feedstock supply and offtake agreements to support future commercial operations. Success of the demonstration plant will raise awareness in the broader industry about MTM's FJH and its potential.

Figure 5: The core process area of the demonstration plant



Source: Company

Figure 6: The block flow diagram of the demonstration plant



Source: Company

Our valuation of MTM

We continue to value MTM at $260.7m or $0.57 per share.

We reiterate our valuation of MTM as in our most recent update from January 2025. We valued the company is $260.7m or $0.57 per share, which was based on 25% of the market cap of peer Alpha HPA (ASX:A4N) from early January 2025 (Figure 7). We have also constructed a bull case with a 33% valuation. We have chosen to retain A4N's January valuation as the basis for our MTM valuation rather than use the current market cap, given the market volatility.

Figure 7: Our Updated Valuation of MTM

Valuation	BASE	BULL
Equity of Alpha HPA (A$m)^	**1,042.6**	**1,042.6**
% Market Cap	25%	33%
Implied Equity of MTM (A$m)	**260.8**	**344.1**
Shares outstanding	458.7	458.7
Implied price (A$ cents)	**0.570**	**0.751**
Current price (A$ cents)	0.205	0.205
Upside (%)	178.0%	266.3%

Source: Pitt Street Research

^ As of 8 January 2025

Although Alpha HPA (ASX:A4N) isn't commercialising a metals recycling technology strictly speaking, it is using a metals extraction and refining technology to produce high-purity alumina (HPA). The company is in Stage 1 of production and is currently building 'Stage 2' which would represent full commercial scale – at 10,4370tpa, making it the largest single-site production of high purity aluminium materials globally.

We continue to believe a 25% NPV weighting is appropriate for now, but 50% could be applicable once there is a formal Feasibility Study and 100% when FJH is in commercial-scale production.

We believed that 25% was an appropriate weighting considering MTM's stage of development, in that it is working on constructing a pilot plant and that it could enter commercial-scale in 3-4 years – and still adhere to this view. As noted in our previous report, we think a 50% valuation could be applicable once there is a formal Feasibility Study, but only 100% (or any valuation above A$600m) when FJH is in commercial-scale production – i.e. at least multiple thousand tonnes per annum.

We foresee MTM being re-rated to our valuation range driven by the following factors:

- Continuing advancement towards the pilot plant's trial on time and within budget,
- Continued testing results which continue to depict FJH's effectiveness.
- Partnerships or collaborations with potential strategic customers and joint-venture partners – both chemical companies and owners of difficult-to-process mineral deposits.
- Securing government grants or other sources of non-dilutive funding in various jurisdictions.
- Further optimisation of the FJH approach.

Risks

We see the following key risks to our investment thesis:

- **Development risk**: The road to a viable commercial product is very long. Much development and engineering work remains which brings with it a risk of technical failures, or at the very minimum, extended development periods.
- **Funding risk**: MTM will continue to require external funding to support its development plans for the foreseeable future. Raising funds on favourable terms (both debt and equity) along with timeliness may be a challenge for the company. If it secures equity funding, this would dilute shareholder value. Any debt financing would not have this effect, but could present challenges dependant on the terms secured and the progress made by the company.
- **Commercial risk:** Even if and when MTM's technology is commercialised, it will be a challenge in and of itself to find commercial partners for its technology. Lower than anticipated adoption rates may hamper future growth.
- **Licensee risk:** MTM's ability to commercialise the FJH technology is from its licensing of the technology from Rice University. A withdrawal of the license or change in conditions could be catastrophic for the company. Alternatively, existing propositions in the agreement may have the potential to hinder FJH's development and commercialisation.
- **Key personnel risk**: There is the risk the company could lose key personnel and be unable to replace them and/or their contribution to the business.

Appendix I – Updated Capital Structure

Capital	Number	% of share capital
Total Ordinary Shares	**458.3**	**84%**
Existing Listed Options (expire Nov-24)	66.5	12%
Performance Rights	23.1	4%
Fully diluted shares	**547.9**	**100%**

Source: Pitt Street Research – as at 10 April 2025

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. 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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