

Metallium Limited

Specialty Minerals and Metals

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Rating
SPECULATIVE BUY

Price Target
A\$1.60

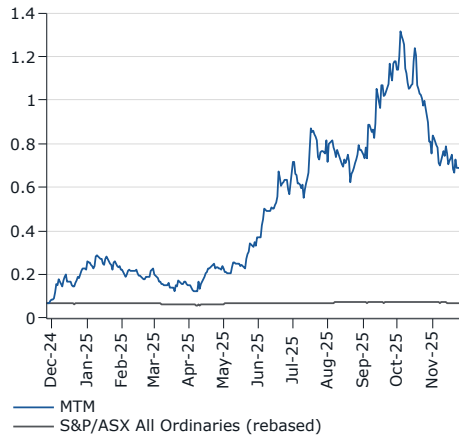
MTM-ASX

Price
A\$0.91

Market Data

52-Week Range (A\$) :	0.07 - 1.49
Market Cap (A\$M) :	556.7
Shares Out. (M) :	615.1
Enterprise Value (A\$M) :	508.7

FYE Jun	2025A	2026E	2027E	2028E
EBITDA (A\$M)	(5.2)	14.4	105.4	187.7
Free Cash Flow (A\$M)	(12.7)	(6.9)	33.2	120.3



Priced as of close of business 26 November 2025

Metallium Limited (MTM-ASX) is a US-based company focussed on the commercialisation of a potentially disruptive and proprietary technology, Flash Joule Heating (FJH). MTM's process has demonstrated potential to improve on metal refinery processes like hydrometallurgy and pyrometallurgy for the recovery of metals across various ore/waste streams (i.e., REE concentrates/ores, e-waste, red mud, magnet waste, black mass).

Trash to treasure

Initiating coverage with a SPECULATIVE BUY rating and \$1.60 target price - Metallium Ltd. (MTM-ASX) is a US-based business with rights to a patented process technology, *Flash Joule Heating (FJH)*, developed at Rice University and de-risked at pilot scale by MTM through a partnership with Knight Hawk Engineering. The technology demonstrates potential to improve on metal refinery processes (i.e., hydrometallurgy/pyrometallurgy) from various feedstocks. Potential verticals include precious, base/critical metals from e-waste, rare earths, lithium, and recovery of metals from bauxite railings. MTM's immediate focus is on e-waste given its high metal content and abundant supply. We think this represents an accelerated path to commercialisation while other market opportunities are developed.

FJH could unlock a veritable gold mine

The US generates ~8Mtpa of e-waste with contained metal content valued at >US\$8bn (Source: UN), including high concentrations of gold, silver, copper, and other critical metals at up to 100x that of in-situ ore-grades. The UN expects global e-waste volumes to grow 30% by 2030. Less than 20% of US e-waste is recycled with a majority land-filled/exported to Asian refineries (ESG credentials are low, opaque economics, and transport costs impacts). Utilising high-value PCB/semiconductor waste feed, MTM has demonstrated high recoveries of metals in a single step without acid or prolonged heating. We think this represents significant potential to improve on incumbent processes.

A pathway to ex-China supply of critical metals

FJH recycling of e-waste, semiconductor waste, and other waste forms (i.e., magnets) could provide an economic and secure domestic solution to the production of critical minerals (i.e., antimony, REE, gallium, germanium). As a result, we believe MTM could be a candidate for US government financing, with MTM having been approved for funding under DoW's SBIR program. Furthermore, FJH has successfully demonstrated impurity removal and processing of rare earth feedstocks. While we acknowledge the preliminary nature of test work completed to date, commercialisation of rare earth processing could be a significant market opportunity, in our view.

Project development in Texas delivers attractive economics

MTM is fully funded for the delivery of *The Texas Manufacturing Campus*, in Chambers County, with commissioning expected in DecQ'25. MTM has planned a staged ramp up to 16,000tpa PCB feed by CY'28/350tpa of semiconductor waste feed from '27. We estimate this could produce 90kozpa AuEq, generating A\$270m in annual EBITDA/A\$190m in FCF. MTM has signed a number of non-binding waste supply agreements (i.e., Glencore, Dynamic Lifecycle, Plastic Recycling Inc.), potentially de-risking initial production plans.

Valuation and recommendation

We set our target price at A\$1.60/share, comprising a heavily risked NPV of our modelled e-waste production scenario. De-risking of our investment case would be delivered through conversion of waste supply agreements and delivery of FJH at commercial scale. We also highlight potential for upside through capacity expansions (i.e., processing 10% of US e-waste by 2030 delivers NPV of A\$4.5bn) and other market opportunities/licensing agreements.

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Figure 1: MTM financial summary

Metallium (MTM:ASX)

Analyst: Reg Spencer
Date: 26/11/2025
Year End: Jun

Rating:
Target Price:

SPEC BUY
A\$1.60

Market Information

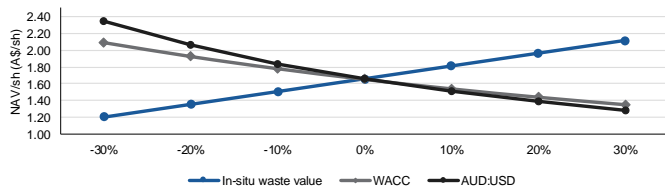
Share Price	A\$	0.91
Market Capitalisation	A\$m	557
12 Month Hi	A\$	1.49
12 Month Lo	A\$	0.07
Issued Capital	m	615
Options	m	71
Fully Diluted	m	686

Valuation		A\$m	A\$/share
Texas Manufacturing Campus	NPV @10%	1,031	1.50
Other		78	0.11
Corporate		(30)	(0.04)
Investments		-	-
ITM options		14	0.02
(Net debt)/cash		48	0.07
Total		1,139	1.66
Price/NAV			0.54x

Target Price (1.00 x NAV)	1.60
Price/TP	0.57x

Assumptions	2025a	2026e	2027e	2028e
Gold (US\$/oz)	2,820	4,051	4,391	4,571
Silver (US\$/oz)	32	50	54	56
Copper (US\$/lb)	4.23	4.89	5.38	5.50
Tin (US\$/lb)	0.65	0.65	0.67	0.69
Antimony (US\$/t)	30,000	30,000	30,000	30,000
Palladium (US\$/oz)	1,500	1,500	1,500	1,500
AUD:USD	0.65	0.65	0.67	0.69

Sensitivity



Contained metal production	2025a	2026e	2027e	2028e
Gold (koz)	0	7	36	58
Silver (koz)	0	67	338	551
Copper (t)	0	202	1020	1666
Tin (t)	0	64	324	529
Antimony (t)	0	21	108	176
Palladium (koz)	0	1	3	4
Gallium (t)	0	2	15	18
Germanium (t)	0	2	15	18

Directors & Management

Name	Position
Michael Walshe	MD & CEO
John Hannaford	Chairman
Anthony Hadley	NED
Paul Niardone	NED
Steve Ragiel	President of Flash Metals

Company Description

Metallium (MTM-ASX) is a US based company focussed on the commercialising of a potentially disruptive and proprietary technology, Flash Joule Heating (FJH). MTM plans to commercialise FJH technology through the processing of e-waste (i.e. printed circuit boards & semi-conductor waste) given it is a high value, high margin waste stream, hosts a large and local addressable market, and provides an accelerated path to market through a Build-Own-Operate model.

Profit and Loss A\$m	2025a	2026e	2027e	2028e
Revenue	0.0	46.4	232.8	385.0
Operating Costs	-0.8	-25.3	-121.4	-191.3
Corporate costs	-4.5	-6.7	-6.0	-6.0
EBITDA	-5.2	14.4	105.4	187.7
Impairment/other non cash adjustments	-27.9	0.0	0.0	0.0
D&A	0.0	0.0	0.0	0.0
Net Interest	0.0	0.3	0.5	1.2
Tax	0.0	-5.5	-31.8	-56.7
NPAT (reported)	-33.1	9.3	74.1	132.2
NPAT	-33.1	9.3	74.1	132.2

EBITDA Margin	nm	31%	45%	49%
EV/EBITDA	-98.5x	35.3x	4.8x	2.7x
EPS	(0.05)	0.02	0.12	0.21
EPS Growth	nm	-128%	698%	78%
PER	nm	60.0x	7.5x	4.2x
Dividend Per Share	nm	nm	nm	nm
Dividend Yield	nm	nm	nm	nm

Cash Flow A\$m	2025a	2026e	2027e	2028e
Cash Receipts	0.0	46.4	232.8	385.0
Cash paid to suppliers & employees	-6.0	-32.0	-127.4	-197.3
Tax Paid	0.0	-7.3	-41.4	-66.8
Net Interest	0.1	0.3	0.5	1.2
Operating Cash Flow	-5.9	7.5	64.5	122.1
Proceeds/payments from sale/purchases	-0.1	0.0	0.0	0.0
Capex	-6.8	-14.4	-31.3	-1.8
Other	0.0	0.0	0.0	0.0
Investing Cash Flow	-6.8	-14.4	-31.3	-1.8
Debt Drawdown (repayment)	0.0	0.0	0.0	0.0
Share capital	17.3	52.2	0.0	0.0
Dividends	0.0	0.0	0.0	0.0
Financing Expenses	-1.0	-3.3	0.0	0.0
Other	-1.0			
Financing Cash Flow	16.3	48.9	0.0	0.0
Opening Cash	0.0	7.3	49.3	82.5
Increase / (Decrease) in cash	3.6	42.0	33.2	120.3
FX Impact	0.0	0.0	0.0	0.0
Closing Cash	3.6	49.3	82.5	202.8

Op. Cashflow/Share	-\$0.01	\$0.01	\$0.10	\$0.20
P/CF	-93.8x	74.4x	8.6x	4.6x
FCF	-12.7	-6.9	33.2	120.3
FCF Yield	-2.3%	-1.2%	6.0%	21.6%

Balance Sheet A\$m	2025a	2026e	2027e	2028e
Cash + S/Term Deposits	7.3	49.3	82.5	202.8
Receivables	0.0	0.0	0.0	0.0
Other current assets	0.6	0.6	0.6	0.6
Current Assets	8.0	49.9	83.1	203.5
Property, Plant & Equip./Exploration	4.1	18.5	49.9	51.6
Intangible assets	14.9	14.9	14.9	14.9
Other Non-current Assets	5.9	7.7	17.3	27.4
Payables	0.9	0.9	0.9	0.9
Short Term Debt	0.0	0.0	0.0	0.0
Long Term Debt	0.0	0.0	0.0	0.0
Other Liabilities	6.3	6.3	6.3	6.3
Net Assets	25.7	83.9	158.0	290.2
Shareholders Funds	39.3	88.1	88.1	88.1
Reserves	26.7	26.7	26.7	26.7
Retained Earnings	-40.2	-30.9	43.2	175.4
Total Equity	25.7	83.9	158.0	290.2

Debt/Equity	0%	0%	0%	0%
Net debt/(cash)	-7.3	-49.3	-82.5	-202.8

Source: Canaccord Genuity estimates

Company Overview

Metallium Limited (MTM-ASX) is a US-based company focussed on the commercialisation of a potentially disruptive and proprietary technology, *Flash Joule Heating (FJH)*. MTM’s process has demonstrated potential to improve metal refinery processes like hydrometallurgy and pyrometallurgy for the recovery of metals across various ore/waste streams (i.e., REE concentrates/ores, e-waste, red mud, magnet waste, black mass).

FJH technology was developed and tested at lab scale over ~8 years by researchers at Rice University and has since been de-risked at pilot scale by MTM in partnership with Knight Hawk Engineering.

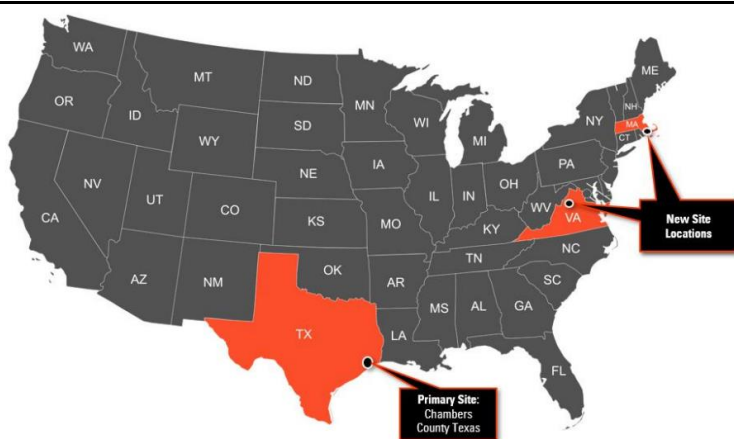
MTM plans to commercialise FJH technology through the processing of e-waste (i.e., printed circuit boards and semi-conductor waste) given it is a high-value, high-margin waste stream, is a large and local addressable market, and provides an accelerated path to market through a build-own-operate model. The process technology offers advantages over incumbent waste processing methods through improved lead times, higher recoveries, improved ESG credentials and lower operating costs/capital intensity. Additionally, MTM offers recyclers a local and transparent processing option with improved economics.

MTM is advancing towards commercial scale production in Chambers County, Texas, with commissioning expected in Dec’25. Demonstration of the technology at scale provides a pathway to binding waste supply agreements and a major de-risking of future earnings. MTM’s development plans have been de-risked through agreements with major waste partners including Glencore, Dynamic Lifecycle, Plastic Recycling Inc., and Indium Corporation.

The company is fully funded for delivery of commercial production with key potential catalysts and near-term news flow including:

- Delivery of demonstration scale plant
- Delivery of binding waste supply agreements
- De-risking of additional revenue pathways
- Securing government grants and/or other forms of government financing

Figure 2: MTM site location



Source: Company Reports, Canaccord Genuity

Figure 3: Texas Manufacturing Campus



Source: Company Reports, Canaccord Genuity

Corporate and finance

Capital structure

MTM has 624m shares on issue, 18m performance rights, and 53m unlisted options at various strike prices and expiry, as illustrated in Figure 4. All options are in-the-money with a weighted average strike price of A\$0.21/share. Should they be converted, this would provide additional equity financing of ~A\$14m.

Substantial shareholders as of 24 Sep'25 include Terra Capital (~7%) and management ~3%.

Figure 4: MTM capital structure

Capital Structure		Shares	Price	Value	Expiry	ITM Option	ITM Value
Issued Shares	m	624	\$0.91	565	na	na	na
MTMAX	m	23	0.25	6	25/03/2027	23.00	5.75
MTMAW	m	1	0.25	0	6/01/2029	1.29	0.32
MTMAR	m	15	0.20	3	7/08/2029	15.25	3.05
MTMAU	m	3	0.12	0	30/11/2026	3.00	0.36
MTMAV	m	3	0.18	1	30/11/2027	3.00	0.54
MTMAZ	m	3.7	0.18	1	29/11/2027	3.66	0.66
MTMAT	m	3.6	0.12	0	29/11/2026	3.64	2.85
Performance Rights	m	18.0	na	0	na	na	na
Total options	m	71	\$0.21	11		52.83	13.53
Fully Diluted	m	766					
Market Capitalisation	A\$m	565					
Market Capitalisation (Fully Diluted)	A\$m	629					

Source: Company Reports, FactSet

Balance sheet and liquidity

As of SepQ'25, MTM had a reported cash balance of A\$49m following a Jun'25 placement, raising A\$50m at A\$0.55/share. We estimate MTM's current cash position to comfortably fund near-term development capital and working capital requirements.

We also highlight that MTM has been approved for Stage 1 funding under DoW's SBIR program for the recovery of gallium, providing a potential pathway to DOW contracts for the production of gallium from the critical minerals line.

Should MTM require additional funding for capacity expansions and/or other product verticals, we highlight numerous funding options available, which include additional US government grants, low-cost US government loans, and/or traditional project financing and equity (see Figure 5).

Figure 5: MTM select US government funding opportunities

MTM funding opportunities			
Agency	Program / Contract	Funding Available	Notes / Relevance to Flash Metals USA
DoD - Defense Logistics Agency (DLA)	Small Business Innovation Research (SBIR), Topic DLA254-003 (DoD BAA 25.4, Release 7)	Up to \$1M	Supports modular processes to convert U.S.-sourced ores, industrial by-products, or recycled waste into cost-competitive gallium metal or oxide.
DoD - DLA	Gallium Recovery and Refining Capacity Grant (Pending)	Undisclosed	Led by Baxter Moody (DLA), focuses on domestic Gallium processing using Flash Metals USA tech.
DoD - Army Research Lab / DEVCOM	APFIT Contract Proposal (Dr Michael Bakas)	\$22M-\$32M	For recovery of antimony and critical metals from DOD surplus equipment. Targets 1-2 deployable refinery units.
DoD - Office of Under Secretary of Defense (Acquisition & Sustainment)	Accelerate the Procurement and Fielding of Innovative Technologies (APFIT)	\$50M	For innovative technologies like Flash Metals' refining systems.
DoD - Industrial Base Analysis and Sustainment (IBAS)	Critical Materials Onshoring Support	\$20M - \$50M+	Intended to support strategic domestic metal processing capacity, aligns with Rice University-developed FJH tech.
DoD - DLA SBIR (General)	Strategic Materials Topics	\$100k Phase I, \$1M Phase II	Potential for scaling FJH applications in REE and gallium recovery.
Department of Energy (DoE)	(Not specified in docs but implied for critical material recovery)	TBD - potentially up to \$100M	Relevant for REE, Ga, Ge, In recovery from waste streams under sustainability programs. (Future engagement likely)

Source: US DoE, US DoD, Company Reports, Canaccord Genuity

Board of directors and key management

See Appendix 2: Board and management profiles for detailed biographies.

Michael Walshe – MD and CEO

Steve Ragiel – President of Flash Metals (100% US subsidiary of MTM)

Simon Adams – CFO and Company Secretary

John Hannaford – Non-Executive Chairman

Anthony Hadley – Non-Executive Director

Paul Niardone – Non-Executive Director

Forecasts and valuation

Our valuation for MTM is predicated on existing development plans under a build-own-operate model targeting metals-rich PCB (printed circuit board) e-waste and semiconductor refinery waste.

Metal production from e-waste

Our base case modelling strictly includes production from *The Texas Technology Campus* and planned production capacity across the e-waste line and critical minerals line, including:

- A staged PCB waste development targeting 8000tpa of feed capacity from late'26, a 12-month ramp up ahead of expansion to 16,000tpa in early CY'28. Producing gold, silver, copper, tin, antimony, and palladium metal chlorides. We assume mid-grade, e-waste feed, representative of expected waste grades delivered under existing LOIs, albeit at conservative recoveries and utilisation.
- We assume the 350tpa specialty critical mineral line to be fed by semiconductor waste material under the Indium LOI, producing gallium and germanium metal chlorides. Given waste volumes have not been detailed, and we expect MTM to continue testing other waste streams at scale, we assume conservative utilisation at 65%.

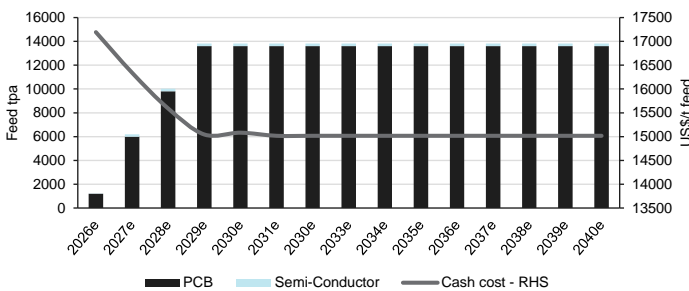
Our key operating assumptions are illustrated in Figure 6.

Figure 6: CGe key operating assumptions

Key operating assumptions	Unit	Value
PCB		
Feed capacity stage 1/2	tpa	8000/16000
Plant life avg In-situ value - PCB	US\$/t	33,000
Utilisation	%	85%
Avg Recoveries	%	90%
Payabilities	%	80%
Feedstock cost on in-situ value	%	30%
Specialty line		
Feed capacity - Specialty	tpa	350
Plant life avg In-situ value - Specialty	US\$/t	340,000
Utilisation - Specialty	%	65%
Recoveries	%	80%
Payabilities	%	80%
Waste cost	%	30%

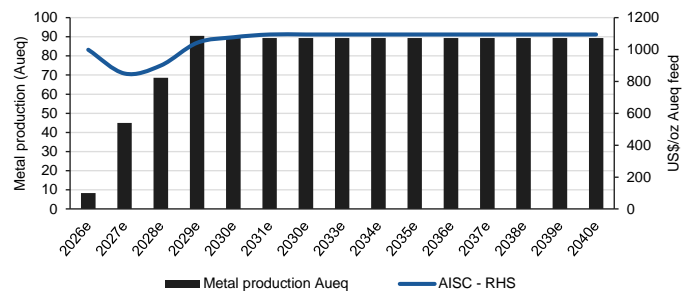
Source: Company Reports, Canaccord Genuity estimates

Figure 7: CGe feed schedule vs unit cost per tonne feed



Source: Company Reports, Canaccord Genuity estimates

Figure 8: CGe contained metal production in Aueq



Source: Company Reports, Canaccord Genuity estimates

E-waste can host high concentrations of gold, silver, copper, antimony, palladium, tin, lead, zinc, and titanium (amongst others). Our forecasts focus on high-value metals, as illustrated in Figure 9. We expect MTM to generate a 40% gross margin

spread (vs. MTM estimates 50%) on in-situ waste value across PCB and semiconductor waste after including conservative payabilities (~20% across metal suite), recovery losses (~10%), and feedstock costs (~30%), as illustrated in Figure 10.

For context, at spot pricing and grades illustrated below, we expect the PCB waste to host an in-situ value of ~US\$35k per tonne waste feed, yielding revenue of US\$24.5k/t (70% of in situ waste value) and EBITDA of US\$10.5k/t (see Figure 9 and Figure 10). While a smaller volume opportunity, we expect semiconductor waste via the critical mineral line to deliver net revenue of US\$238k/t and EBITDA of US\$102k/t.

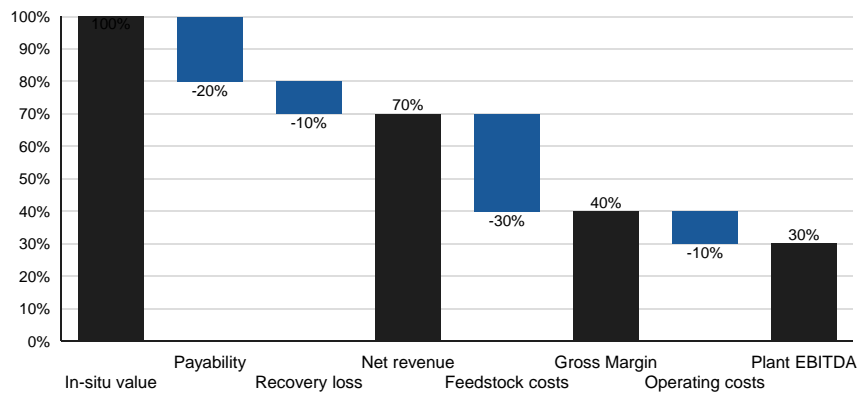
Figure 9: CGe in-situ value forecasts at spot commodity pricing

PCB feedstock grade			Price			In-situ value		
Gold	g/t	200	Gold	US\$/oz	4161	Gold	US\$/t	26,756
Silver	g/t	3000	Silver	US\$/oz	52	Silver	US\$/t	5,016
Copper	%	20%	Copper	US\$/lb	5	Copper	US\$/t	2,204
Antimony	%	2%	Antimony	US\$/t	30000	Antimony	US\$/t	600
Palladium	g/t	15	Palladium	US\$/oz	1435	Palladium	US\$/t	692
PCB total							US\$/t	35,268

Semi conductor waste			Price			In-situ value		
Gallium	%	10%	Gallium	US\$/kg	400	Gallium	US\$/t	40,000
Germanium	%	10%	Germanium	US\$/kg	3000	Germanium	US\$/t	300,000
Semi conductor total							US\$/t	340,000

Source: Asian metals, Factset, Canaccord Genuity estimates *Priced 26/11/2025

Figure 10: CGe illustrative EBITDA build up on in-situ value



Source: Canaccord Genuity estimates

Pricing

Our estimates are based on our precious, base, and critical minerals price deck with gallium and germanium Asian Metals spot pricing assumed in perpetuity. Our product price forecasts are illustrated in Figure 11.

Figure 11: CGe pricing assumptions

		2026e	2027e	2028e	2029e	2030e
Gold	US\$/oz	4,315	4,464	4,643	4,745	4,745
Silver	US\$/oz	53	54	56	57	57
Copper	US\$/lb	5	6	6	6	5
Tin	US\$/lb	1	1	1	1	1
Antimony	US\$/t	30,000	30,000	30,000	30,000	30,000
Palladium	US\$/oz	1,500	1,500	1,500	1,500	1,500
Gallium	US\$/kg	400	400	400	400	400
Germanium	US\$/kg	3,000	3,000	3,000	3,000	3,000
AUD:USD	FX	0.66	0.67	0.70	0.70	0.70

Source: Canaccord Genuity estimates

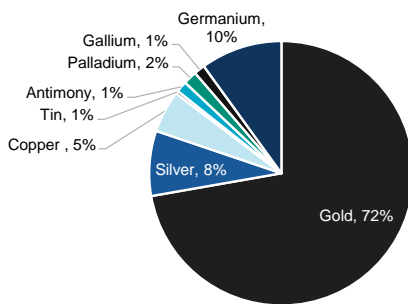
Earnings forecasts

We believe MTM’s low capex and potentially rapid and low-cost processing pathway can deliver both cost advantages and emissions improvements on incumbent processing technologies, resulting in substantial operating margins.

Our base case modelling and price deck suggests MTM’s Stage 2 project can deliver annual average EBITDA of ~A\$270mpa, EBITDA margins of 52%, and FCF of ~US\$190m. Should MTM deliver binding feedstock agreements across planned plant capacity, this would present potential upside to our estimates, noting our conservative utilisation assumptions.

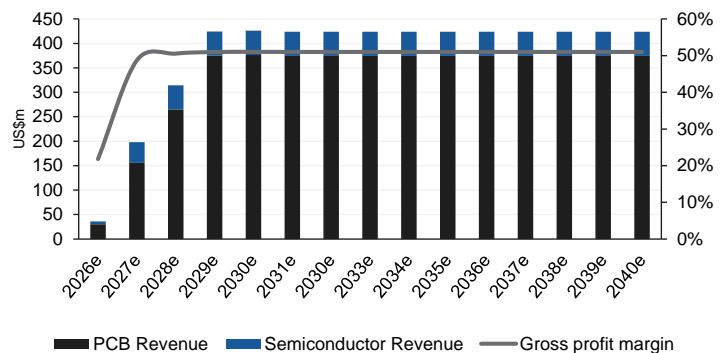
Additional upside/downside risk comes in the form of metal feed grade and/or commodity pricing (i.e., key drivers of in-situ waste value).

Figure 12: Revenue by metal



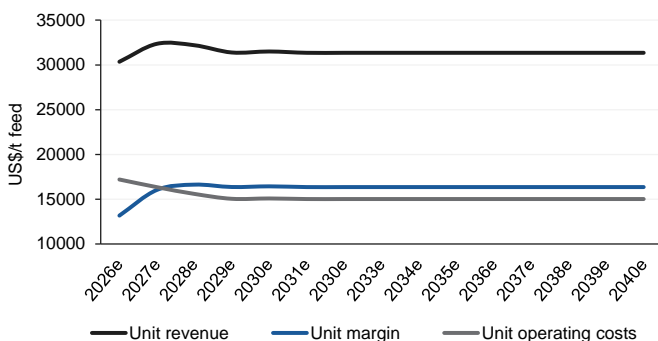
Source: Canaccord Genuity estimates, Revenue split subject to metal pricing

Figure 13: Revenue by waste



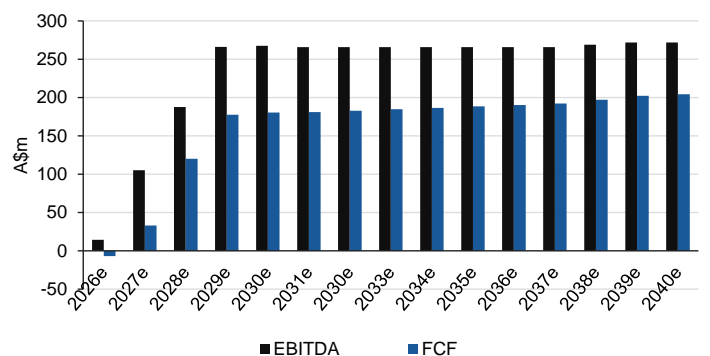
Source: Canaccord Genuity estimates

Figure 14: CGe unit operating margins on US\$/t waste feed



Source: Canaccord Genuity estimates

Figure 15: Base case EBITDA & FCF forecasts



Source: Canaccord Genuity estimates

Valuation

Our valuation is primarily driven by a DCF of our base case production scenario for MTM's *Texas Technology Campus*, where we estimate an un-risked NPV10% of ~A\$1.9bn (NPV A\$2.70/share fully diluted), IRR of 62%, and payback of 0.5 years.

We apply a nominal 55% risking to our project NPV to capture financing, ramp up, technology, and feedstock supply risk. We also apply a nominal US\$50m valuation to our SOTP valuation for additional potential revenue streams/product verticals (i.e., REE processing royalties, red mud, lithium), noting de-risking of additional revenue streams presents upside potential to our base case modelling.

Net of balance sheet, corporate, and ITM option adjustments, we estimate a net asset value of ~A\$1.3bn and NAVPS of A\$1.66/share (diluted for ITM options and performance rights).

Figure 16: CGe valuation

DCF DISCOUNT RATE	10%	Real, post-tax	Shares	615	NAV MULTIPLE	1.0x
Sensitivity	100%		ITM options	53		
Reporting Currency	A\$m		OTM options	18		
AUD:USD	0.64		Fully-diluted Shares	686		
Valuation date	1-Jan-26					

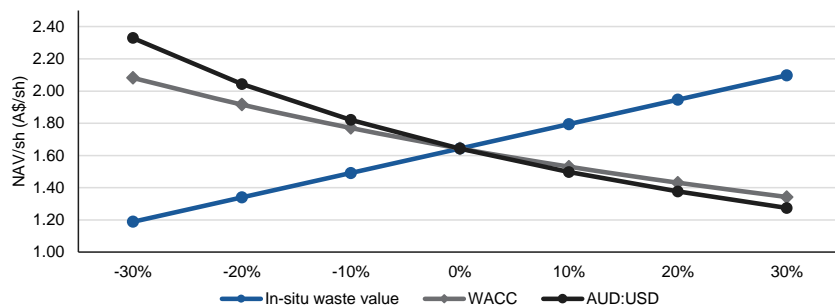
	US\$M	A\$M	RISK ADJ.	EQUITY	A\$M	PER SHARE	Target Operating NAV/share
OPERATING NAV							
Texas	1,208	1,874	55%	100%	1,031	\$1.50	\$1.50
SUB TOTAL	1,208	1,874			-	\$1.50	\$1.50
NON OPERATING NAV							
Other	50	78			78	\$0.11	\$0.11
Investments	-	-			-	\$0.00	\$0.00
ITM options	9	14			14	\$0.02	\$0.02
Corporate	(20)	(30)			(30)	-\$0.04	-\$0.04
(Net debt)/cash	31	48			48	\$0.07	\$0.07
TOTAL	1,278	1,983			1,139	1.66	\$1.66
					Target (rounded)		A\$1.60

Source: Company Reports, Canaccord Genuity estimates

Sensitivity analysis

Figure 17 illustrates our valuation NAV/share sensitivity to in-situ waste value, WACC, and FX.

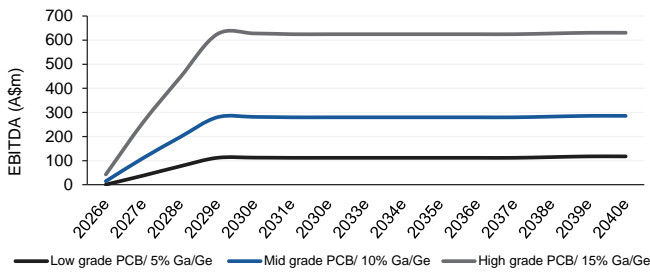
Figure 17: Sensitivity to valuation



Source: Canaccord Genuity estimates

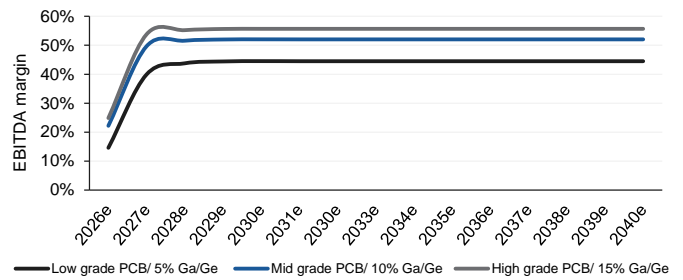
Our earnings forecasts are highly sensitive to in-situ waste value (i.e., grade x price), noting EBITDA margins remain partially hedged against moves in waste grade and pricing volatility given feedstock costs are priced on in-situ value and represent ~80% of opex at spot pricing. We illustrate EBITDA sensitivity to PCB grade (and waste value) on our price deck below.

Figure 18: EBITDA sensitivity to grade



Source: Canaccord Genuity estimates

Figure 19: EBITDA margins sensitivity to grade



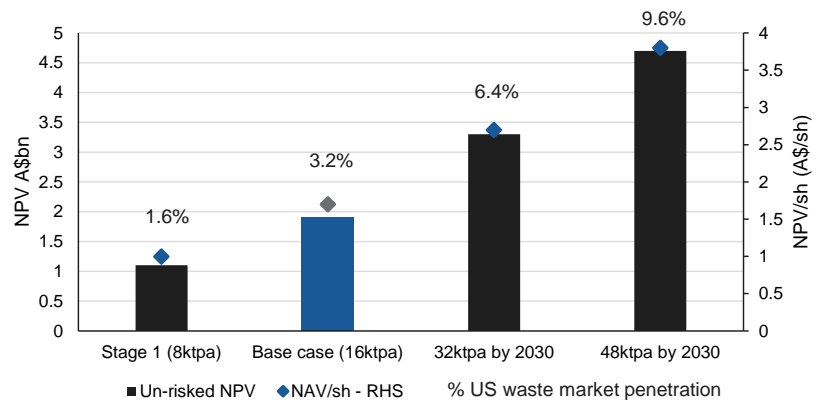
Source: Canaccord Genuity estimates

Valuation upside potential is significant when looking at the addressable e-waste market

We highlight material valuation upside potential should MTM deliver capacity expansions at additional locations, noting MTM's US growth plan includes exclusive options for FJH processing sites in Westport, Massachusetts, and Harrisonburg, Virginia.

While we see waste supply assurance as the key bottleneck to expansion, delivery of two additional facilities at the same scale as Texas would represent less than 10% of the US PCB waste market, notwithstanding the ability for MTM to expand offshore. Additionally, we highlight potential for other waste streams (i.e., semiconductor waste, magnet waste) to support additional capacity, noting the low capex and modular nature of the plant supports rapid delivery. That said, we see de-risking of supply and waste grade/in-situ value as a key catalyst for the shares.

Figure 20: Un-risked NPV at various feed capacity vs. PCB waste market penetration



Source: Canaccord Genuity estimates

Peers provide valuation support

We believe peer valuations could provide additional valuation support, noting major recyclers trade on ~8x EV/EBITDA, implying an EV of ~A\$900m on our Stage 1 EBITDA forecasts and ~A\$2.2bn on Stage 2. Additionally, we highlight other pre-production companies with metal/material processing IP.

Figure 21: Potential market peers

Company	Code	Mkt Cap (A\$m)	FY'25 EV/EBITDA	Description
Recyclers/waste processing				
Sims	SGM-ASX	3140	8.2x	Ferrous & non ferrous scrap & IT scrap recycler
Umicore	UMI-BRU	6390	7.1x	Precious, automotive, specialty recycling
Aurubis AG	NDA-DE	8950	7.5x	Multi metal recycling
Advanced IP material companies				
5N Plus	VNP-TSE	1937	15.6x	Semiconductor materials producer
Alpha HPA	A4N-ASX	819	nm	Unique process to produce HPA
Iperion X	IPX-ASX	1638	nm	Processing of metal scrap to produce Ti metal
Ucore	UCU-TSE	683	nm	Rare earth separation technology

Source: Factset, Priced 26/11/2025

Investment risks

Commodity price fluctuation risks - As a potential producer of metal products, MTM will be exposed to commodity price fluctuations, often driven by macro-economic forces including inflationary pressures, interest rates, and supply and demand factors. These factors are external and could reduce the profitability and prospective outlook for the business.

Technology/Operational risks - MTM technologies has demonstrated efficacy at lab and pilot scale. There are risks associated with scaling up production which may result in lower recoveries, longer ramp up, lower production rate, and/or higher production costs. Once commercial scale production is achieved, MTM will be subject to operating risks such as plant/equipment breakdowns, metallurgical, materials handling, and other technical issues. Additionally, an increase in operating or feedstock costs may reduce profitability and FCF generation from operating assets and negatively impact valuation.

Sales/Feedstock risk- MTM is yet to sign any binding commercial scale product supply agreements/contracts. While MTM has signed several MOU/LOI for the supply of waste feedstock, there is no guarantee these will lead to binding agreements. This could lead to underutilised PPE, reduced cashflow generation, and negatively impact valuation.

MTM – Technology overview

The tech – Flash Joule Heating

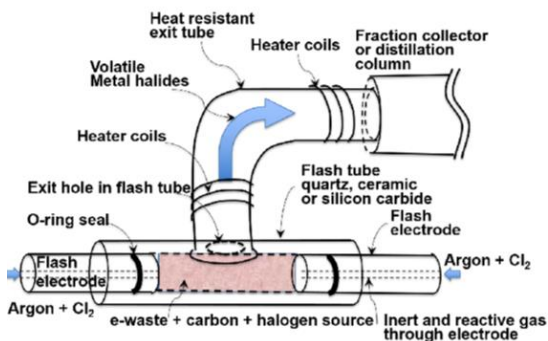
MTM’s core processing IP, *Flash Joule Heating (FJH)*, has shown potential, albeit at lab scale, to improve metal recovery processes (i.e., hydrometallurgy and pyrometallurgy) across a number of metal process verticals (REE, Li, e-waste, Red mud) through reduced energy consumption, reagent use, and waste.

FJH has been de-risked at lab scale by Rice University across multiple verticals and further confirmed by Knight Hawk Engineering at pilot scale. We note that the technology has undergone 8 years of extensive research (see [Technology history](#)).

FJH is an electrothermal process that utilises the principle of electrical resistance to generate intense heat within materials almost instantaneously. This is achieved by passing a current through a material, where the resistance of the materials itself converts electrical energy into heat energy. The process can achieve temperatures >3,000°C almost instantaneously.

By applying this technology to ore/waste streams, MTM can thermodynamically target desired metals, selectively recovering them based on free energy formation.

Figure 22: Illustrative FJH reactor with chlorination



Source: Rice University

Figure 23: Lab scale FJH reactor



Source: Company Reports

While “Joule heating” itself is not unique to Rice University, MTM has licensed the proprietary methods that enable effective FJH. The intellectual property covers specialized chemical additives and catalysts, patented material preparation, optimized energy application, and the use of specific reactants (such as chlorine gas) to recover metals from waste and ore.

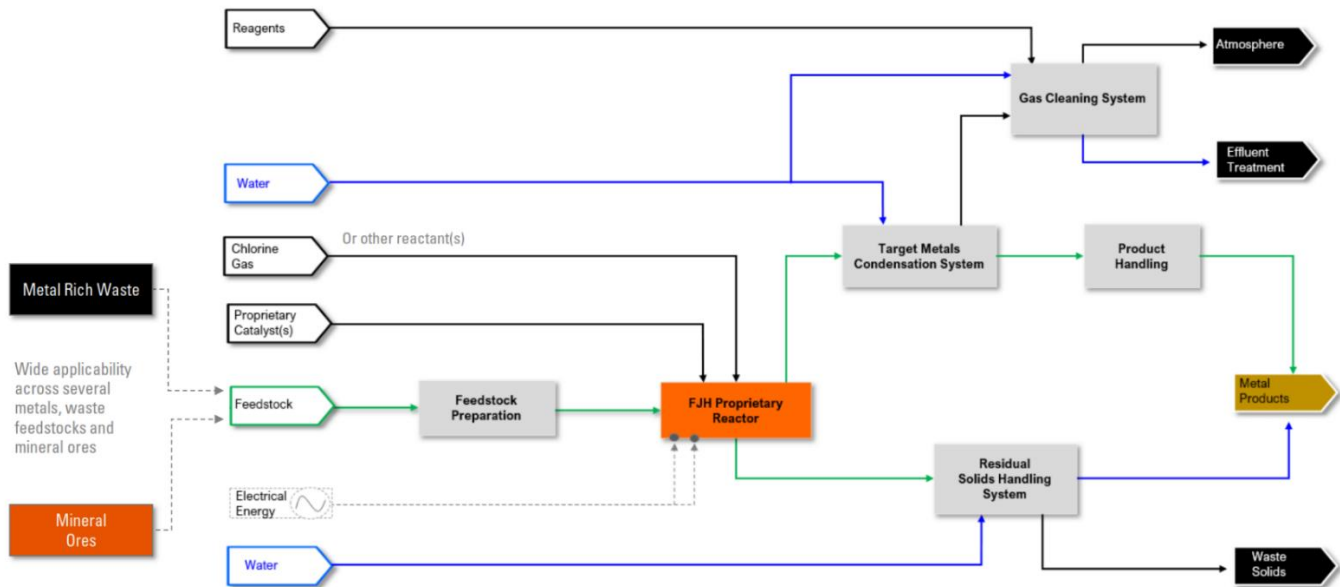
The license agreement (see [MTM/Rice license agreement](#)) gives MTM the right to proprietary technology for the recovery of base, precious, and critical metals from industrial waste, ores, e-waste, and end-of-life batteries.

While the broader process flowsheet will be feedstock dependant, the application of FJH to a waste or ore feedstock is illustrated below:

- With a programmable current (i.e., voltage input), temperatures can be precisely controlled over a wide range supporting thermodynamically selective treatment of metals from ore/waste.
- Electrical energy is applied directly to waste causing instantaneous heating of the material.

- With the help of proprietary catalysts, target metals are vaporised as chlorides (or other reactants) in seconds, without the need for strong acids or long resident times.
- Metal chlorides are then condensed into solution; these products may be sold as a chloride solution and or further refined into finished metals (i.e., electrolysis).

Figure 24: MTM's proprietary system block flow diagram



Source: Company Reports

FJH has delivered promising results across several verticals

At bench and prototype scale, MTM has demonstrated the ability to improve on existing metal recovery operations (i.e., hydrometallurgy and pyrometallurgy) across various material process operations through reduced acid consumption, lower water requirements, improved recoveries, and fewer process steps.

Generally, conventional hydrometallurgical processes (i.e., acid/alkaline leaching and solvent extraction) exhibit good selectivity yet suffer from material water and chemical consumption and often lead to wastewater streams. Pyrometallurgical processes often lack selectivity with increased energy costs.

MTM has evaluated feedstocks that readily conduct electricity and present good candidates for FJH including:

- The conversion of spodumene to lithium chloride
- Gallium and germanium recovery from industrial semiconductor scrap
- Metal recovery from e-waste printed circuit boards (i.e., Au, Ag, Cu, Sn, and Pd)
- REE recovery from monazite-rich concentrate
- Metal recovery from battery waste
- REE recovery from recycled magnets
- Processing of bauxite tailings (i.e., red mud)

FJH commercialisation

MTM is focussed on commercialising FJH through a dual-pronged strategy including:

1. Build-own-operate model for electronic PCB waste and other waste streams (i.e., semi-conductors, NdFeb magnets)
2. Licensing and royalty model for mineral processing verticals (i.e., lithium/REE/red mud).

We see the immediate revenue opportunity in the processing of waste streams with other commercialisation opportunities being longer dated (i.e., monazite con/MREC, red mud, spodumene, battery waste).

E-waste is MTM's immediate path to market

MTM's initial focus and most immediate opportunity is on PCB e-waste given it is a high value, high margin waste stream, is readily available, hosts a large and local addressable market, and provides an accelerated path to market through a build-own-operate model.

E-waste 101 – a high grade (urban) mine

E-waste refers to any discarded electrical equipment or device (i.e., computers, phones, printers, medical equipment, LEDs, etc.), some of which contain printed circuit boards (PCB). PCBs consist of ~30% metals, ~30% ceramics, and 40% polymers. They contain valuable metals in high concentration including gold, silver, copper, lead, nickel, palladium, and antimony (amongst others). In the case of semiconductor waste, it can include high concentrations of critical metals like indium, gallium, and germanium.

Figure 25: PCB-rich e-waste and semiconductor waste – MTM's target feedstock



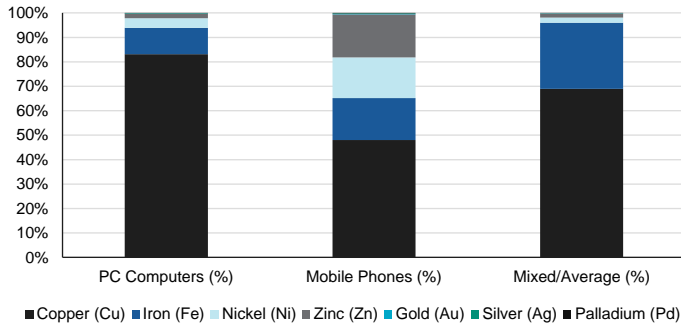
Source: UN global E-waste monitor

PCBs are typically classified into three primary grades (i.e., high, mid, and low) based on precious metal content. Importantly, the lowest grade PCBs far exceed that of mined ore, presenting an extremely valuable feedstock, should it be successfully recovered.

- Low-grade PCB typically refers to PCBs hosting <100g/t Au with sources typically including consumer electronic products like radios, TVs, displays.
- Medium-grade PCB grades 100-400g/t; graphic cards, modern LCDs., desktop monitors/computers.
- High-grade PCB grades >400g/t typically within smart phones, high-end computers, mainframe computers, and servers.

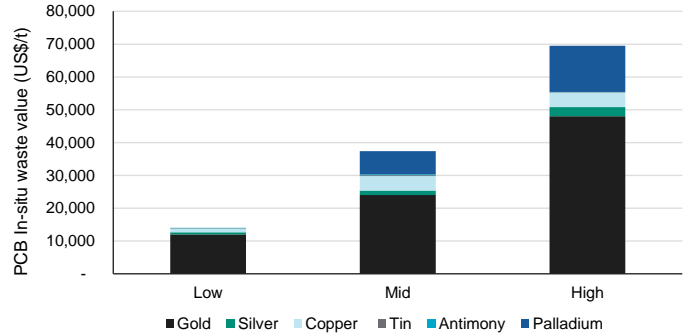
- Semiconductor refinery/product waste can grade up to 20% indium, 15% gallium and 20% germanium, hosting in-situ waste value of US\$150-600k/t, albeit smaller waste volumes are generated annually.

Figure 26: PCB metal composition



Source: Sciencedirect

Figure 27: Indicative e-waste values



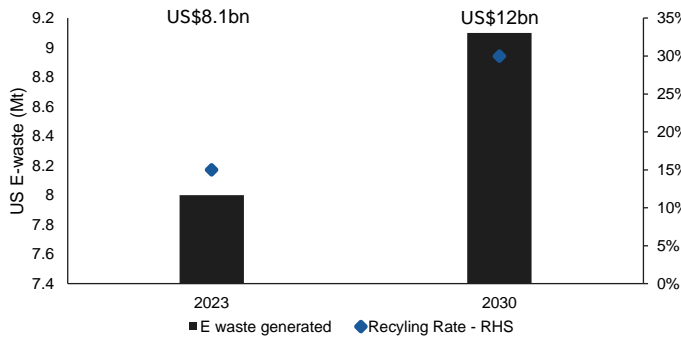
Source: Company Reports, Factset, Asian Metals, PCB master

The incumbent supply chain for e-waste involves collection and transportation of waste, pre-processing and hazard removal, shredding, and sorting to generate a refinable feedstock, typically handled by recyclers. A larger portion of this product is then exported to refineries in Asia, undergoing pyrometallurgical (i.e., high temperature smelting) or hydrometallurgical (i.e., acid leaching) processes to produce metal alloys or cyanide solutions which can be further refined into finished metals.

A large, accessible and underutilised waste stream

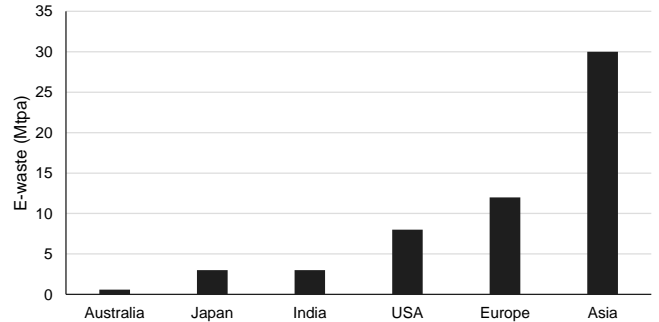
The US generates 8Mt of e-waste every year including 1.6Mt of high-value, metal-rich waste, with <20% effectively recycled through smelting facilities and a large portion exported to smelters in Asia. The UN expects the global e-waste market to grow ~30% by 2030 primarily driven by electrification, AI/data centres, consumer electronic growth, and shorter product lifecycles. Globally, the UN estimates annual waste generation to be ~62Mtpa.

Figure 28: US waste generation, recycling, and value



Source: Company Reports, UNITAR

Figure 29: E-waste generation by region



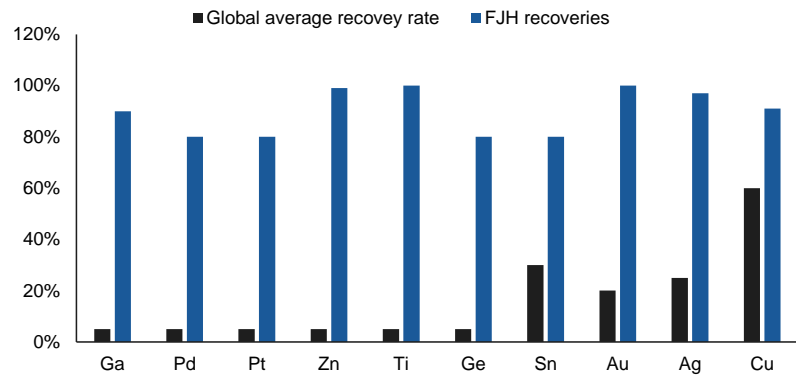
Source: UNITAR, Company Reports

According to our research, metal-rich PCB can range from between 3% to 10% of total electronic waste, representing up to 800ktpa of potential feed in the US or 6mtpa globally, noting up to 50% of this can enter landfill.

FJH demonstrates superior recoveries and returns to incumbent methods

Utilising high-value printed circuit board feedstock, MTM has achieved recoveries of >95% for Au and Ti, and >90% Ag, Sn, and Zn into water-soluble metal chlorides. MTM’s processing of e-waste into metal chlorides at high recovery rates in a single step without acid or prolonged heating present potential to improve on incumbent recovery methods for e-waste metal recovery (see Figure 30). Additionally, it provides increased incentive to recyclers who are typically paid on recoverable metal while also providing a local, financially transparent processing option.

Figure 30: FJH recoveries

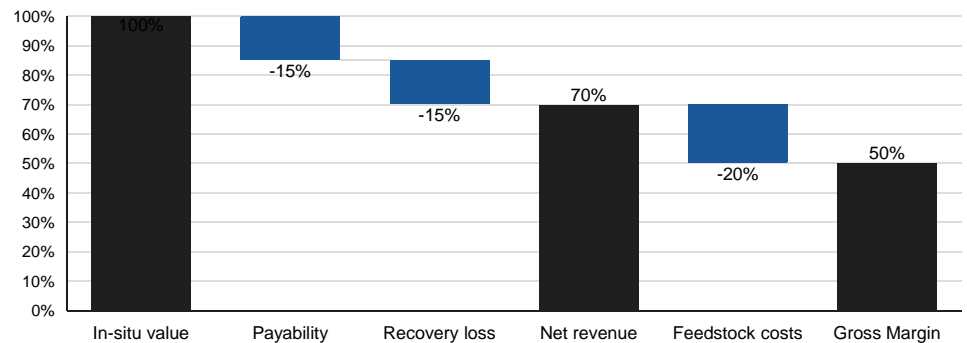


Source: Company Reports

When effectively recovered, e-waste is a high-value, high-margin waste stream

MTM’s indicative supply agreements support a 50% gross margin spread on contained feedstock metal value after accounting for feedstock cost, recovery losses, and payabilities. Noting feedstock price will be in-situ metal linked and represent a discounted contained metal value (~20% of in-situ value in line with market norms).

Figure 31: MTM’s illustrative gross margin spread



Source: Company Reports

The gallium and germanium opportunity

Gallium and germanium are designated critical minerals by the US DoW. The US lacks primary domestic production of gallium, while imports supply over half its germanium demand. China’s 2024 export restrictions on gallium and germanium have intensified global supply concerns, driving gallium prices up by more than 60% year-to-date in Western markets.

High voltage semiconductors/chips used in data centres, EVs, and consumer electronics host gallium and germanium in high concentrations (up to 20%) due to their superior electronic properties.

Through partnership with both the DoW and Indium Corporation, MTM will utilise FJH to recover Ga/Ge from LED scrap, semiconductor scrap, and other gallium-rich waste streams, noting MTM has achieved Ga/Ge recoveries of >90% from semiconductor refinery waste delivered under the Indium LOI. While waste volume data is limited, de-risking of Ga/Ge waste at scale could present a material revenue opportunity given the high unit waste value (up to US\$600k/t). For context, Ga/Ge represents ~12% our forecast revenue on conservative grade (10% Ga/10% Ge) and utilisation (65%) with delivery of binding agreements at plant capacity and/or confirmation of higher grades providing upside to our estimates.

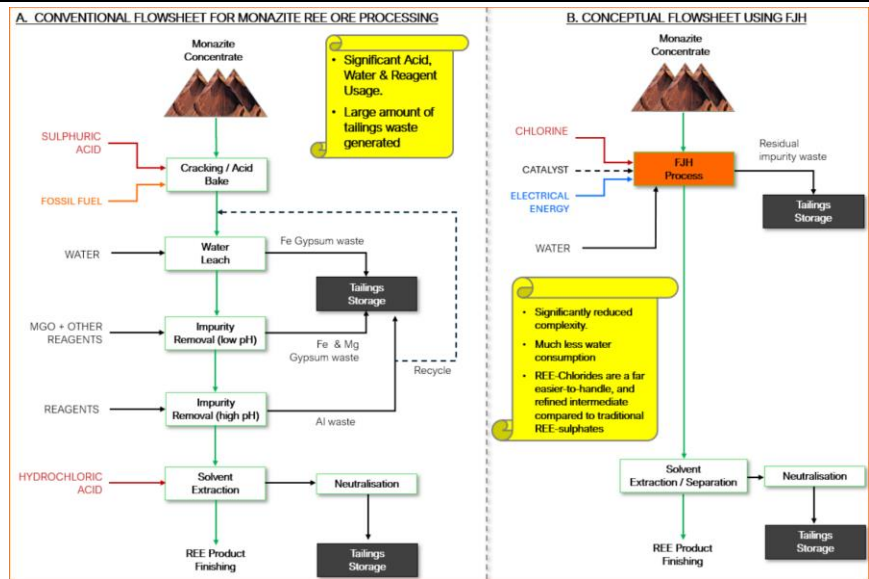
Rare earth elements – pathway to an ex-China supply chain

MTM will target a licensing, technology partnership, and/or royalty model for FJH’s application to REE ores.

MTM has successfully utilised FJH to treat monazite-rich REE concentrate, highlighting potential for FJH to improve on cracking and leaching within conventional REE flowsheets. A single flash converted 93% off monazite hosted REE’s into a REE chloride with >90% purity at attractive recoveries.

While we acknowledge the benchtop nature of work completed to date, results highlight potential for reduced acid consumption, lower water requirements, and improved by-product management compared to conventional REE process routes. MTM’s illustrative flowsheet as it relates to conventional monazite is illustrated in Figure 32.

Figure 32: Simplified flowsheet comparison of conventional monazite REE process vs. FJH

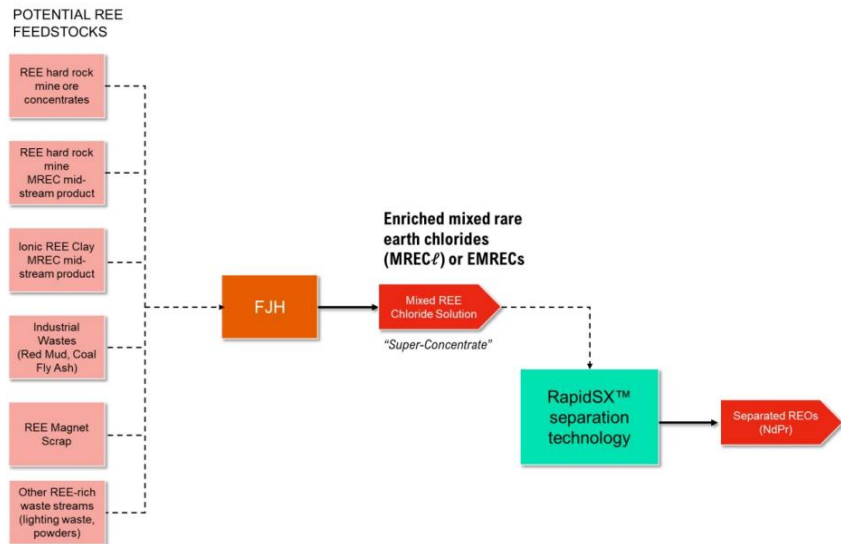


Source: Company Reports

Additionally, through an MOU with Meteoric Resources (MEI-ASX: A\$0.17| SPEC BUY, A\$0.40 target price, Reg Spencer), MTM has successfully removed >80% of low value material from Calediera’s MREC providing a material increase in valuable REE concentration (see [MEI & MTM to explore downstream processing](#)). FJH delivered promising recoveries across the TREO distribution into a chloride product, including 65-75% for NdPr and ~80% Dy/Tb. The process also effectively separates low value La and Ce, increasing the concentration of higher value MREOs in chloride. This could lead to better product payability, reduced downstream processing, and transport costs.

Through its partnership with Ucore, a REE separation technology company backed by the DoW, MTM plans to explore the potential of producing separated rare earth oxides (see Appendix 1). For context, MTM FJH technology acts an upstream, upgrading step, producing chloride intermediates that are then refined into individual REEs using Ucore’s RapidSX™ separation platform. Through this partnership, MTM and Ucore highlight a pathway for an integrated ex-China REE supply chain, as illustrated in Figure 33.

Figure 33: Illustrative integrated FJH – rapid SX flowsheet



Source: Company Reports, Canaccord Genuity

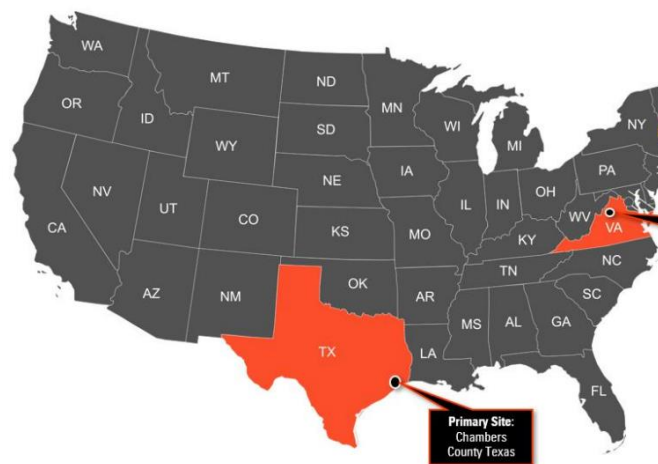
This is of importance given China controls ~75% of global rare earth refining capacity and ~70% of mine production - see our recent sector research: [Rare Earths | Opportunity emerges as the dust settles](#). While we acknowledge the scale limitations of test work completed to date, should MTM and Ucore deliver a low capex and economically attractive separation pathway, it would remove a critical bottleneck for Western REE projects. That said, we attribute little value to the application of FJH to REE given the limited visibility on commercial outcomes.

Project development – Urban mining in TX

MTM has de-risked FJH technology for the recovery of precious, base, and critical metals from PCB waste at lab scale (through Rice University) and pilot scale (through a partnership with Knight Hawk Engineering). MTM is now focused on delivering a 100% owned commercial scale facility, *The Texas Technology Campus*, in Chambers County, Texas.

MTM has acquired a pre-existing site that is fully permitted and hosts existing industrial infrastructure including high-capacity power, sealed pads, rail access, and warehousing, supporting an accelerated and capital efficient development pathway.

Figure 34: Metallium site location



Source: Company Reports, Canaccord Genuity

Figure 35: Texas Technology Campus



Source: Company Reports

Figure 36: Demonstration scale plant illustration



Source: Company Reports

E-waste processing

MTM's Technology Campus development plans envisage a staged development with two operating lines:

1. A two-staged PCB feed FJH plant, fed by mid- to high-grade PCB waste, producing gold (Au), silver (Ag), copper (Cu), tin (Sn), antimony (Sb), and

palladium (Pd). Stage 1 will host PCB feed capacity of 8,000tpa with a Stage 2 expansion to 16,000tpa.

2. A specialty critical metals line aimed at testing high-value mineral and industrial residues, and waste streams (i.e., refinery wastes, magnet scrap, semiconductor scrap). This line will have capacity of 350tpa and will target production of REE, gallium (Ga), germanium (Ge), antimony (Sb), and niobium (Nb).

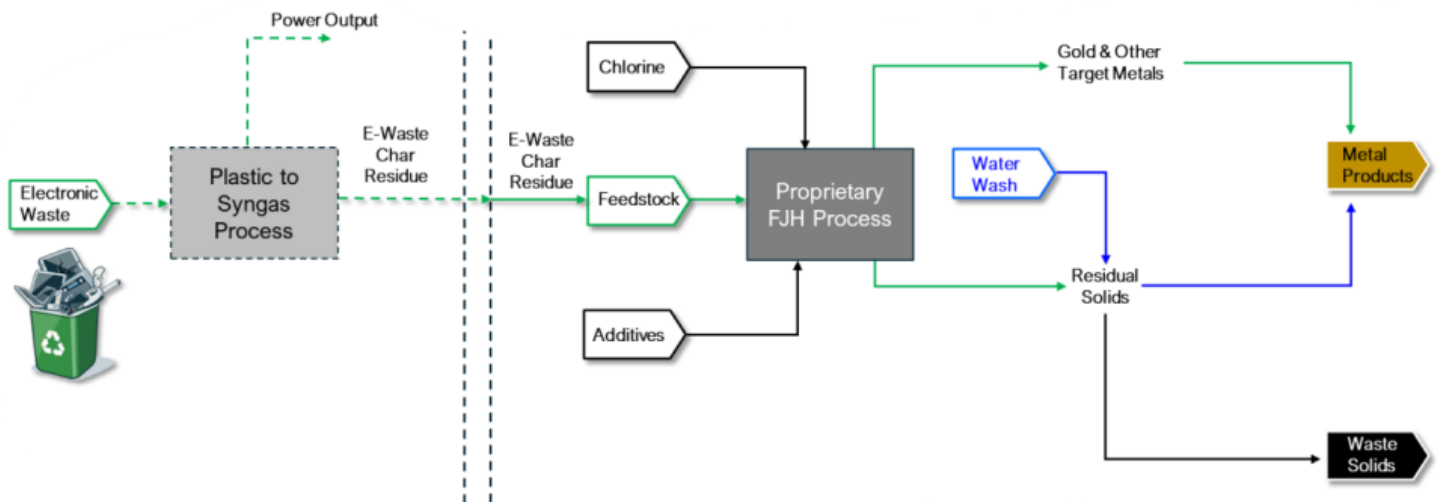
Texas process flow

The production process for the e-waste stream will be underpinned by FJH and MTM’s proprietary process flow sheet. We expect the key steps to produce metals from e-waste to be as follows:

- MTM will receive metals-rich printed circuit boards (PCB) from third-party waste providers (i.e., Glencore) with PCB grades assayed ahead of delivery.
- PCB will undergo aluminium/ferrous removal, size reduction, and a heat-based deplasticisation step, producing a concentrated metal-rich char feedstock (i.e., ~2 - 4x grade uplift).
- Metal-rich char feedstock will enter the FJH crucible, whereby electrical energy is applied directly to the waste causing instantaneous heating of the target metals. Combined with chlorine and proprietary additives, the metals are evaporated (i.e., “flashed”) into a metal chloride in seconds, effectively distilling the target metals from the solid feedstock. This produces metal chloride products and a residual solids waste stream.
- Metal chlorides are then condensed into solution; these products are further polished to individual solid metal products or may be sold as a chloride solution to a refinery or other buyers.

A simplified process flowsheet is illustrated in Figure 37.

Figure 37: Simplified process flow diagram for MTM e-waste processing



Source: Company Reports, Canaccord Genuity

We expect the specialty critical minerals line to process various waste streams, supporting further development and commercialisation of FJH verticals. Should the feed be primarily semiconductor waste, we expect the flow sheet to be similar to that outlined above.

Pilot scale testing completed to date has delivered high recovery rates on a mid-grade waste streams into chloride solution (see Figure 38). While we acknowledge scale-up risk, the commercial scale crucible has been independently tested and

validated, matching heat transfer performance of smaller scale prototypes, de-risking recovery performance at scale, in our view.

Figure 38: Recovery results on e-waste reported to date

Element	Recovery
PCB waste	
Antimony	98%
Gold	100%
Silver	97%
Copper	91%
Tin	97%
Aluminium	91%
Zinc	99%
Nickel	81%
Titanium	100%
Semiconductor/ LED Waste	
Gallium	90%
Germanium	80%

Source: Company Reports

Production, costs, and capex forecasts

Our production modelling aligns with MTM development plans, albeit with conservatism built in across all operating estimates. Our key production assumptions are illustrated in Figure 39.

Figure 39: CGe production assumptions

Key operating assumptions	Unit	Value
PCB		
Feed capacity stage 1/2	tpa	8000/16000
Plant life avg In-situ value - PCB	US\$/t	33,000
Utilisation	%	85%
Avg Recoveries	%	90%
Payabilities	%	80%
Feedstock cost on in-situ value	%	30%
Specialty line		
Feed capacity - Specialty	tpa	350
Plant life avg In-situ value - Specialty	US\$/t	340,000
Utilisation - Specialty	%	65%
Recoveries	%	90%
Payabilities	%	80%
Waste cost	%	30%

Source: Canaccord Genuity estimates

While MTM hasn't provided the market with project operating costs or development capex, it has illustrated gross margins on in-situ PCB waste value. Waste costs will be metals index linked and priced at 20% of in-situ metal value.

For conservatism, we assume waste costs at 30% of in-situ value with waste totalling ~85% of operating costs. Other operating costs include processing (~1%), labour (~12%), maintenance (<1%), and leasing (<1%) with our assumptions illustrated in Figure 40. Given MTM is pre-production with limited operating estimates published to date, our estimates are highly preliminary in nature.

Figure 40: CGe costs and capex assumptions

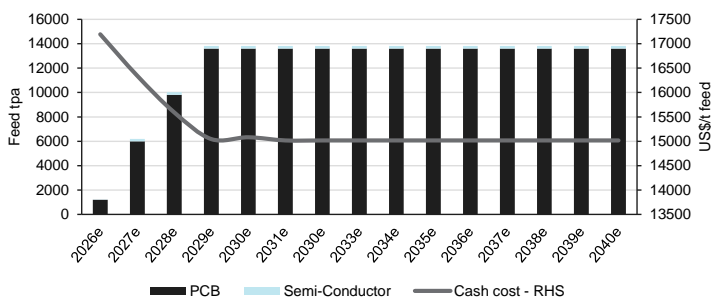
Costs & Capex	Unit	Stage 1	Stage 2
Operating cost assumptions			
Feedstock costs - % insitu value	%	30	30
Processing costs	US\$/t	2500	2250
Royalties	%	1.50%	1.50%
Plant life avg In-situ value - PCB	US\$/t	33,000	33,000
Plant life avg In-situ value - Specialty	US\$/t	340,000	340,000
Operating costs			
Feedstock	US\$mpa	110	220
Processing	US\$mpa	20	36
Labour	US\$mpa	1	1.6
Maintenance	US\$mpa	0.8	1.2
Leasing	US\$mpa	0.4	0.4
Capex			
Development capex	US\$m	25	20
Sustaining capital	US\$m	0.8	1.2

Source: Canaccord Genuity estimates

Our base case modelling assumes MTM can be a significant producer of base, critical, and precious metals, noting on a gold metal equivalent basis we estimate MTM could produce ~90kozpa Aueq at AISC of ~US\$1,100/oz Aueq, placing it attractively among mid-tier gold producers on the ASX.

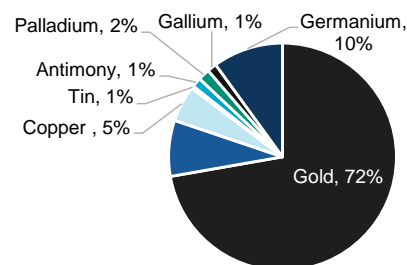
Additionally, MTM’s development plans place it amongst few ex-China producers of specialty critical metals (i.e., antimony, gallium, germanium, and REE), providing significant strategic value.

Figure 41: Plant feed vs. cost



Source: Canaccord Genuity estimates

Figure 42: Value contribution by metal



Source: Canaccord Genuity estimates

Feedstock supply

MTM has signed a number of feedstock supply agreements (MOUs and LOIs) with major partners to support delivery of Stage 1, de-risking assurance of supply and underpinning Stage 1 development, in our view. These include:

- MOU with Glencore to be a “major supplier” of Stage 1 feed capacity with scope to expand volumes. The MOU includes technical support for incoming feed assaying and offtake for up to 75% of marketable recycled metals. While the MOU does not define volumes, we note Glencore’s recycling division processes more than 100ktpa of e-waste annually and has recycled more than 1mt since 1990, presenting strong assurance for PCB supply, in our view.
- LOI with Dynamic Lifecycle, a US-based recycling partner, for the supply of ~800tpa of PCB-rich e-waste material over a 5-year term.
- LOI with Plastic Recycling Inc., a leading e-scrap supplier, for 400tpa over a 5-year term.
- MOU with Indium Corporation for the supply of gallium/germanium-rich semiconductor refinery waste.

We see conversion of these supply agreements to binding contracts as a major de-risking of project development. That said, MTM’s planned production capacity represents ~3% of estimated annual US PCB waste production, providing further confidence in supply assurance.

Expansion potential

Given the low capex requirements, limited footprint, and modularity of the process flowsheet, we are of the view MTM can comfortably expand process capacity. We expect any capacity expansion to be strategically located near high waste generation hubs, noting the key bottleneck to expansion is assurance of feedstock supply and reliance on third-party waste collection, in our view. That said, current capacity represents <5% of the US waste market and <1% of global PCB waste generation. Additionally, we highlight potential for capacity expansions to support other waste streams, noting promising test results across magnet waste and black mass.

US growth plans

MTM’s US growth plan includes exclusive options for FJH processing sites in Westport, Massachusetts and Harrisonburg, Virginia. Both locations are fully permitted for e-waste and industrial-waste processing with co-located metal-recycling operations, enabling rapid deployment of modular units. Each site offers existing industrial infrastructure including high-capacity power, sealed pads, rail access, and warehousing for efficient, low-cost expansion. The Massachusetts site is within Mid-City Scrap’s metals campus, while the Virginia site is part of Recycle Management LLC’s facility near Northern Virginia’s data-centre corridor, a major e-waste generating region.

Timeline

MTM’s preliminary schedule calls for dry commissioning in Dec’25, wet commissioning in early CY’26, with both production lines ramping up to full capacity by 2H’26. Beyond this, MTM is targeting Stage 2 expansion in Q4’26, as illustrated in Figure 43. Our production modelling assumes a more conservative ramp up versus MTM.

Figure 43: MTM indicative timeline

2025 Q4			2026 Q1			2026 Q2			2026 Q3			2026 Q4		
Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<ul style="list-style-type: none"> Installation Dry Commissioning 			<ul style="list-style-type: none"> Wet Commissioning PCB Line Wet Commissioning Specialty Metal Line Optimisation Both Lines 			<ul style="list-style-type: none"> PCB Line Ramp Up Specialty Metal Line Ramp-Up 			<ul style="list-style-type: none"> PCB Line Nameplate Capacity Specialty Metal Line Nameplate Capacity 			<ul style="list-style-type: none"> PCB Line Stage-2 Expansion Specialty Metal Line Potential Expansion 		

Source: Company Reports

Other FJH opportunities

MTM has completed lab/prototype scale test work on several ore/waste streams including spodumene, monazite, and bauxite tailings. Rice University has also published extensive test work across battery-waste streams.

Lithium - Conversion of spodumene to lithium chloride

MTM has successfully converted spodumene concentrate (SC6%) directly to lithium chloride in a single, acid-free unit operation. While MTM has not yet provided detail on yields or opex, MTM's preliminary estimates suggest a potential energy saving of up to 75% and an improvement in capex. For context, conventional processing involves at least five major steps (i.e., calcination, acid roasting, leaching, purification, and sulphation); the FJH route reduces this to just one step. A flowsheet comparison is illustrated in Figure 44.

Figure 44: Simplified flowsheet of convention

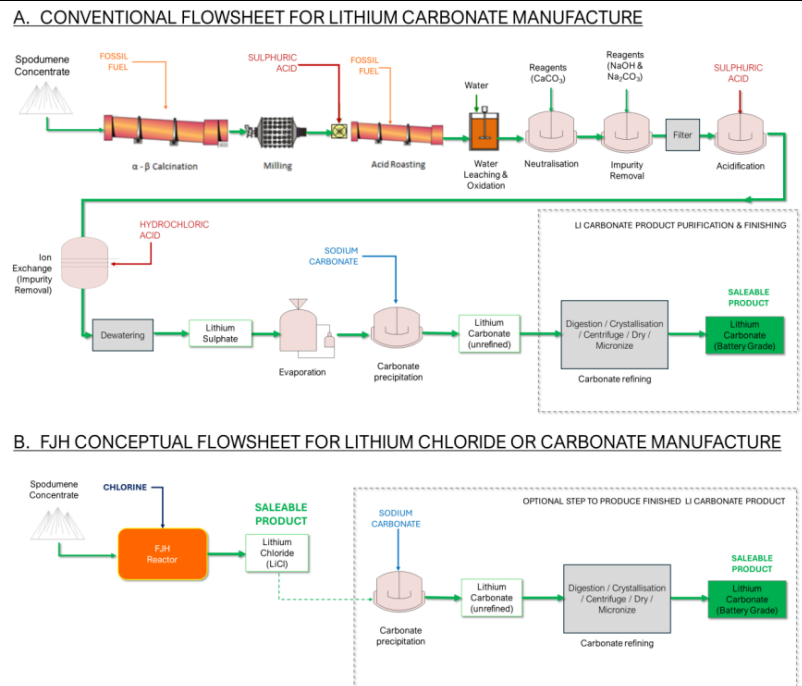


Figure 1: A. Simplified flowsheet for conventional Li_2CO_3 production from hardrock spodumene ore source. B. FJH single step process to produce saleable Lithium Chloride with optional further steps to Li_2CO_3

Source: Company Reports

Additionally, MTM has successfully converted alpha spodumene to beta spodumene, achieving 93% conversion and 81% reduction in residence time versus incumbent pyro met operations.

The company will continue its test work to demonstrate the scalability and effectiveness of the FJH and chlorination-enhanced FJH technology with a focus on maximising lithium recovery and minimising energy consumption.

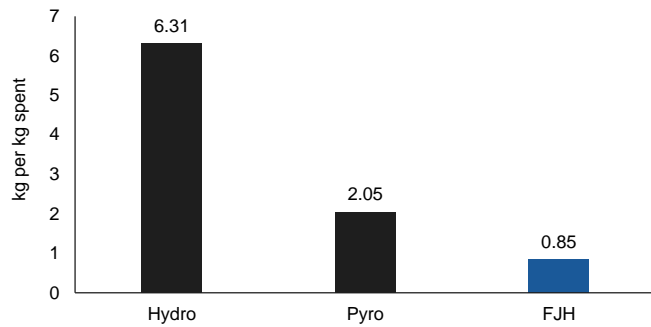
Bauxite tailings processing

MTM has successfully removed iron and sodium from bauxite tailings (i.e., red mud), producing saleable ferric chloride, creating a pathway to recover high-value residual metals like aluminium, titanium, REEs, scandium, and gallium. In conjunction with this, MTM is investigating the use of low-iron red mud, processed via FJH, as an input in cement production to partially replace clinker. MTM has signed an MOU with leading aluminium producer Vedanta Ltd. for the supply of red mud (see Vedanta agreement).

Rice University provides visibility on operating benefits in battery waste

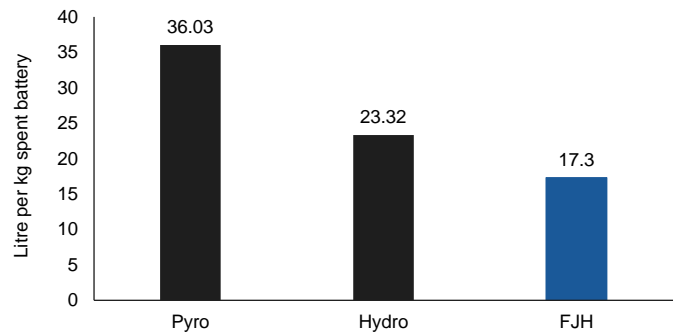
Work completed by Rice University researchers, targeting metal recovery from spent lithium battery black mass, illustrated material improvements in acid consumption, water requirements, energy, and metal recoveries compared to existing pyro met and hydro met processes. Results delivered a 30% and 50% improvement in processing costs against pyromet and hydromet, respectively. While we acknowledge the bench scale test work does not directly correlate to scaled up operations, it presents insight into the potential application of FJH in metal processing from battery waste streams.

Figure 45: Concentrated HCl consumption



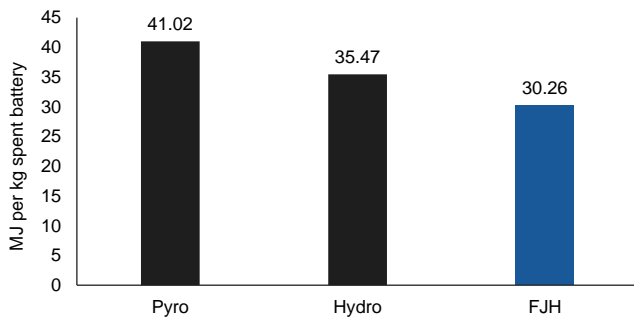
Source: Weiyin Chen, Science Advance

Figure 46: Water consumption



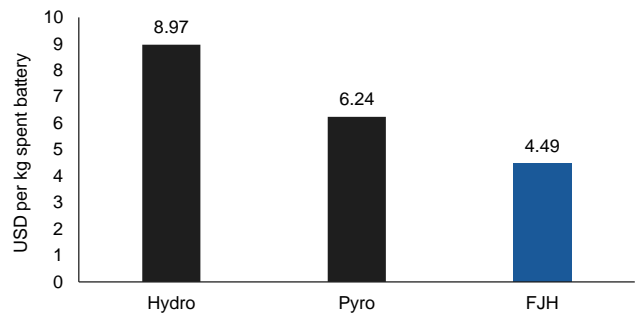
Source: Weiyin Chen, Science Advance

Figure 47: Energy consumption



Source: Weiyin Chen, Science Advance

Figure 48: Processing cost



Source: Weiyin Chen, Science Advance

Appendix 1 – Supply /Technology agreements

MTM/Rice license agreement

MTM has been granted a world-wide exclusive license under the agreement to use the Rice patents which relate to (1) ultrafast synthesis of carbide, corundum nanoparticles, and precious metal recovery from waste by a flashing Joule heating process; (2) removal of heavy metals from waste, and (3) recycling of spent batteries by Flash Joule heating; and a non-exclusive right to use the Rice Patent which relates to recovery and reuse of conductive additives for Flash Joule heating.

Key commercial terms include:

- Upfront payment of US\$300,000
- Annual maintenance fees of US\$10,000 per annum until first commercial sales are recorded
- Three milestone commercialisation fees, totalling US\$275,000, payable upon funding and revenue targets as follows:
 - Receiving US\$7.5m in funding for the development and commercialisation of Rice licensed products
 - Achieving US\$15m in adjusted gross sales
 - Achieving US\$50m in adjusted gross sales
 - Once commercial sales commence, Rice will earn a 1.5% royalty on adjusted gross sales

Dynamic Lifecycle e-waste agreement

MTM has signed an LOI with Dynamic Lifecycle, a US-based recycling partner, for the supply of high grade e-waste. The key commercial terms include:

- Annual volumes of 800tpa in PCB-rich e-waste material with a minimum annual volume commitment of 700 tonnes
- A 5-year initial term, with a renewal option for additional 5-year terms
- The market-indexed pricing linked to the Scrap Register monthly average price for electronic scrap
- The supply arrangement is exclusive for the first 700 tons pa of e-scrap
- Either party may terminate the contract earlier for cause or if the supplier fails to deliver at least 100% of the agreed minimum annual volume for two consecutive years.

Vedanta agreement

MTM has signed an MOU with Vedanta Ltd., a global leader in aluminium production, which allows for its proprietary FJH technology for red mud recycling in the extraction of critical metals and investigating its potential in carbon-reduced cement production. The MOU terms are demonstrated:

- There are no financial obligations or payments under this non-binding MOU
- MTM to conduct prototype-scale testing and proof-of-concept trials on Vedanta-supplied red mud
- Vedanta to supply red mud feedstock from its alumina operations
- The MOU contract will remain in effect for 12 months from the date signed unless it is extended by a mutual agreement

Agreement with Plastic Recycling Inc.

MTM has secured its second long-term supply agreement for processed electronic scrap with Plastic Recycling Inc., a US plastic and electronic scrap recycling and materials recovery company. The key commercial terms include:

- A 5-year initial term with an optional 5-year renewal
- A targeted volume of up to 400 tonnes pa of PES with a minimum annual volume commitment of up to 300 tonnes
- The first 300 tonnes are exclusive to MTM
- The PES must be pre-processed to concentrate recoverable metals through the removal of fiberglass and plastics
- The pricing is linked to the prevailing Scrap Register Index and only adjusted by actual assay results from MTM's processing
- The LOI shows quarterly delivery metrics, with the failure to meet minimum volume targets resulting in penalties

Agreement with Indium Corporation

MTM has come into an MOU collaboration with Indium Corporation, a leading supplier of refined gallium, germanium, indium, and other specialty technology metals. Under the MOU, MTM will process scrap materials of Ga, Ge, In, and Sn which has been provided by Indium, advancing recovery methods using the FJH technology. The MOU details are highlighted through:

- There is no consideration relevant to this MOU
- MTM to conduct testing on the feedstock provided by Indium, recover gallium and other target metals, analyse pre- and post-process compositions, and share relevant data and results
- Indium to supply feedstock containing target metals to MTM, provide feedstock composition data, and discuss quality and quantity of the recovered products
- The MOU will remain in effect for 12 months from the signing date, unless extended by mutual agreement

Agreement with Glencore

MTM has executed an MOU with Glencore for the supply of e-waste feedstock, technical services for incoming feedstock (i.e., assaying), and offtake over 75% over MTM marketable metal products. The MOU provides no detail on volumes, pricing, or financial terms. Additionally, Glencore will provide technical services such as feedstock assaying to enhance quality control and processing efficiency.

MOU with Meteoric Resources

MEI and MTM entered into an MOU to collaborate on potential downstream processing of Caldeira's Mixed Rare Earth Carbonate (MREC) product using MTM's proprietary Flash Joule heating technology. The agreement follows successful proof-of-concept test work on MREC from MEI's Caldeira project. Objectives of the collaboration include the evaluation of technical and commercial feasibility of applying the FJH technology to MEI's MREC, flowsheet integration, data and information sharing, and commercial structuring. Terms are non-binding.

Binding deal with Ucore

MTM entered into a binding technology agreement with Ucore whereby each party will process the other's feedstocks, integrating MTM's FJH with Ucore's RapidSX™. Under the agreement:

- The collaboration will explore opportunities to bypass conventional acid-leach circuits by converting REE-bearing feedstocks into enriched mixed rare earth chlorides (MREC_l) or 'EMRECs', selectively remove deleterious elements, and apply FJH as a pre-treatment for high-Fe/Al feedstocks to enable their acceptance in downstream systems.
- The parties will also investigate the recovery of the highly strategic heavy REE terbium (Tb) and other high-value elements from lighting waste and phosphor powders.

Appendix 2 – Technology history

FJH has been de-risked at lab scale by Rice University, across multiple verticals, and further confirmed by Knight Hawk Engineering at pilot scale. Noting, the technology has undergone 8 years of extensive research and test work, we outline the history below:

- FJH was first developed by Professor James Tour at Rice University, Houston, in 2017 where he and his team de-risked FJH to produce graphene from various carbon sources.
- Rice licensed the technology to the private company Universal Matter in 2018 (strictly for graphene production). Universal Matter delivered demonstration scale production in 2023, operating at 1tpd.
- Over 2018–2023, Rice continued FJH test work on various feedstocks, publishing successful recovery results across:
 - REE recoveries from several waste streams (i.e., coal fly ash, bauxite tailings/red mud, and electronic waste)
 - Critical metal recovery from black mass battery waste
 - Precious metal recovery from electronic waste
- May'24 - MTM secured exclusive global rights to the patented FJH technology for the recovery of rare earth elements, critical metals, and metallic compounds from ore, industrial waste, e-scrap and batteries.
- July'24 - MTM announced positive results of FJH on spodumene concentrate, successfully converting alpha spodumene to beta spodumene with an 81% reduction in residence time.
- Aug'24 - MTM successfully converted spodumene to lithium chloride and achieved high rates gallium and germanium recovery from semiconductor waste.
- Oct'24 - MTM secured A\$8m to advance development. Additionally, MTM delivered high multi-metal recoveries from e-waste, outperforming incumbent recoveries.
- Nov'24 - MTM signed an MOU with Indium Corporation.
- Dec'24 - MTM completed a strategic placement for A\$7.5m, including institutional shareholder's Pengana and Terra Capital.
- Jan'25 - MTM delivered breakthrough recoveries of REE from Monazite.
- Mar'25 - MTM signed a non-binding MOU with Vedanta to process red mud.
- Apr' 25 - MTM secured a second e-waste supply agreement for the supply of up to 400tpa of e-waste.
- May'25 -MTM secured a pre-permitted site for demonstration scale production.
- Sep'25 – Awarded contract with US DoD for recovery of gallium and binding deal with Ucore for US REE refining.
- Oct'25 – Rice reports recovery results on magnet waste.

Appendix 3 – Board and management

Michael Walshe – MD & CEO

Chemical Engineer & MBA with over 15 years of international experience in engineering, operations, technology commercialisation, and project development across the minerals, chemicals, and energy sectors. Prior to MTM, Mr. Walshe served as CEO of Voltaic Strategic Resources Ltd. (ASX: VSR), a battery metals and rare earths exploration company. His career includes a decade with Metso: Outotec, a global leader in mining and metals processing technology solutions, where he held senior leadership roles such as Director and Vice President for the Asia Pacific Minerals division.

Steve Ragieli – President of Flash Metals

He has more than 30 years of worldwide experience in industrial services, environmental services, commercialization of technologies, renewable energy, solid waste recycling, and manufacturing businesses. Mr. Ragieli has a strong network across the industrial recycling industry in the US with a strong knowledge base in supply and demand of source material and end products from industrial recycling.

John Hannaford – Non-Executive Chairman

John Hannaford is an experienced corporate executive with extensive experience in the ASX resources sector as corporate advisor, executive, chairman, promoter, and investor. Mr. Hannaford has founded and listed several companies on the ASX.

Anthony Hadley – Non-Executive Director

Tony Hadley is a metallurgist and rare earth element (REE) technical expert with more than 30 years of experience. He has worked extensively in the REE sector, having previously held the roles of General Manager with both Lynas Corporation (ASX:LYC) at the world-class Mt Weld light REE mine, and subsequently with Northern Minerals Limited (ASX:NTU) at Australia's first heavy REE mine at Browns Range. Mr. Hadley is a technical advisor to Meteoric Resources (ASX:MEI) which has an Ionic Clay REE project in Brazil.

Paul Niardone – Non-Executive Director

Paul Niardone is an experienced director and executive in a range of roles for ASX-listed companies, private entities, and not-for-profit organisations. Mr. Niardone has over 15 years' experience advising and establishing businesses, including the Agency Group Ltd where he has been an executive Director since 2013. He is Founder and Executive Director of Professional Public Relations. Mr. Niardone has an extensive network of connections across business and government which have been developed from direct involvement across a range of businesses and sectors.

Simon Adams – CFO & Company Secretary

Simon Adams is an experienced CFO with background in a range of industries including mineral exploration, upstream energy sector (oil and gas), aquaculture (pearl production and distribution), hybrid power systems (design and manufacture), and mining (gold exploration and mining). Mr. Adams has gained a wide range of experience as a senior member of the executive team in organisations that have had operations globally including USA, Indonesia, and Australia.

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Investment Recommendation

Date and time of first dissemination: November 26, 2025, 14:30 ET

Date and time of production: November 26, 2025, 08:20 ET

Target Price / Valuation Methodology:

Metallium Limited - MTM

Our target price comprises a risked NPV of our modelled Texas Manufacturing Campus development scenario net of balance sheet, corporate, and ITM option adjustments.

Risks to achieving Target Price / Valuation:

Metallium Limited - MTM

Commodity price fluctuation risks - As a potential producer of metal products, MTM will be exposed to commodity price fluctuations, often driven by macro-economic forces including inflationary pressures, interest rates, and supply and demand factors. These factors are external and could reduce the profitability and prospective outlook for the business.

Technology/Operational risks - There are risks associated with scaling up production which may result in lower recoveries, longer ramp up, lower production rate, and/or higher production costs. Once commercial scale production is achieved, MTM will be subject to operating risks such as plant/equipment breakdowns, metallurgical, materials handling, and other technical issues. Additionally, an increase in operating or feedstock costs may reduce profitability and FCF generation from operating assets and negatively impact valuation.

Sales/Feedstock risk - MTM is yet to sign any binding commercial scale product supply agreements/contracts. While MTM has signed several MOU/LOI for the supply of waste feedstock, there is no guarantee these will lead to binding agreements. This could lead to underutilised PPE, reduced cashflow generation, and negatively impact valuation.

Distribution of Ratings:

Global Stock Ratings (as of 11/26/25)

Rating	Coverage Universe		IB Clients
	#	%	%
Buy	683	69.77%	24.89%
Hold	144	14.71%	7.64%
Sell	5	0.51%	0.00%
Speculative Buy	140	14.30%	62.86%
	979*	100.0%	

*Total includes stocks that are Under Review

Canaccord Genuity Ratings System

BUY: The stock is expected to generate returns greater than 10% during the next 12 months.

HOLD: The stock is expected to generate returns from -10% to 10% during the next 12 months.

SELL: The stock is expected to generate returns less than -10% during the next 12 months.

NOT RATED: Canaccord Genuity does not provide research coverage of the relevant issuer.

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*As of January 1, 2024, the Ratings History Chart will reflect the new Canaccord Genuity Ratings System as defined above.

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SPECULATIVE: The stock bears significantly above-average risk and volatility. Investments in the stock may result in material loss.

12-Month Recommendation History (as of date same as the **Global Stock Ratings** table)

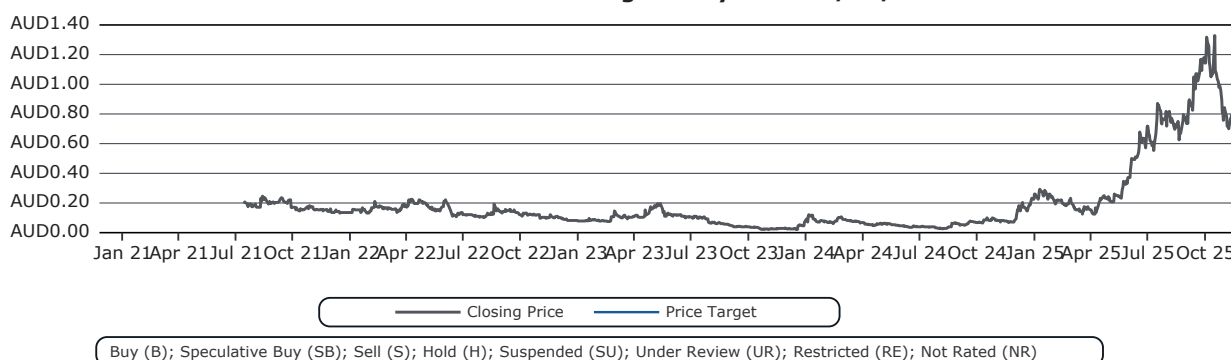
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An analyst has visited the material operations of Metallium Limited. Partial payment was received for the related travel costs.

Metallium Limited Rating History as of 11/25/2025



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