

# Extracting Critical Metals from Red Mud and Other Mine Waste

Dr. Sumedh Gostu, Dr. Anthony Staley



# Team



120+ years of Experience in Mining and Metals.

## Founding Team:



Dr. Sumedh Gostu  
CEO, Cofounder

Technical and Commercial roles in multi-commodity markets



Dr. Anthony Staley  
Executive Advisor, Cofounder

Mining, Metallurgical Operations

## Advisors:



Nick Popovic  
Advisor and Investor

Former Head Glencore Trading



Terry McNulty  
Advisor

Creator of the McNulty Ramp-up Curves



# Problem

## Red Mud: A Century Old Waste Resource

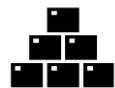
 Bauxite ore



Tailings 



Red Mud  
(2-4 Tons)

 Aluminum (1 Ton)



4 Billion

Tons  
of Waste stockpiled

150-200  
Million

Additional tons  
produced every year

# Opportunity

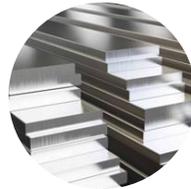
Red Mud (RM) is a Lucrative Source of Metals and Revenue



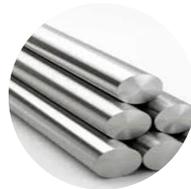
**4 Billion Tons** of  
Red Mud =  
**\$3-4 Trillion**  
mineral value



1.3 Billion Tons of Iron



570 Million Tons of Alumina



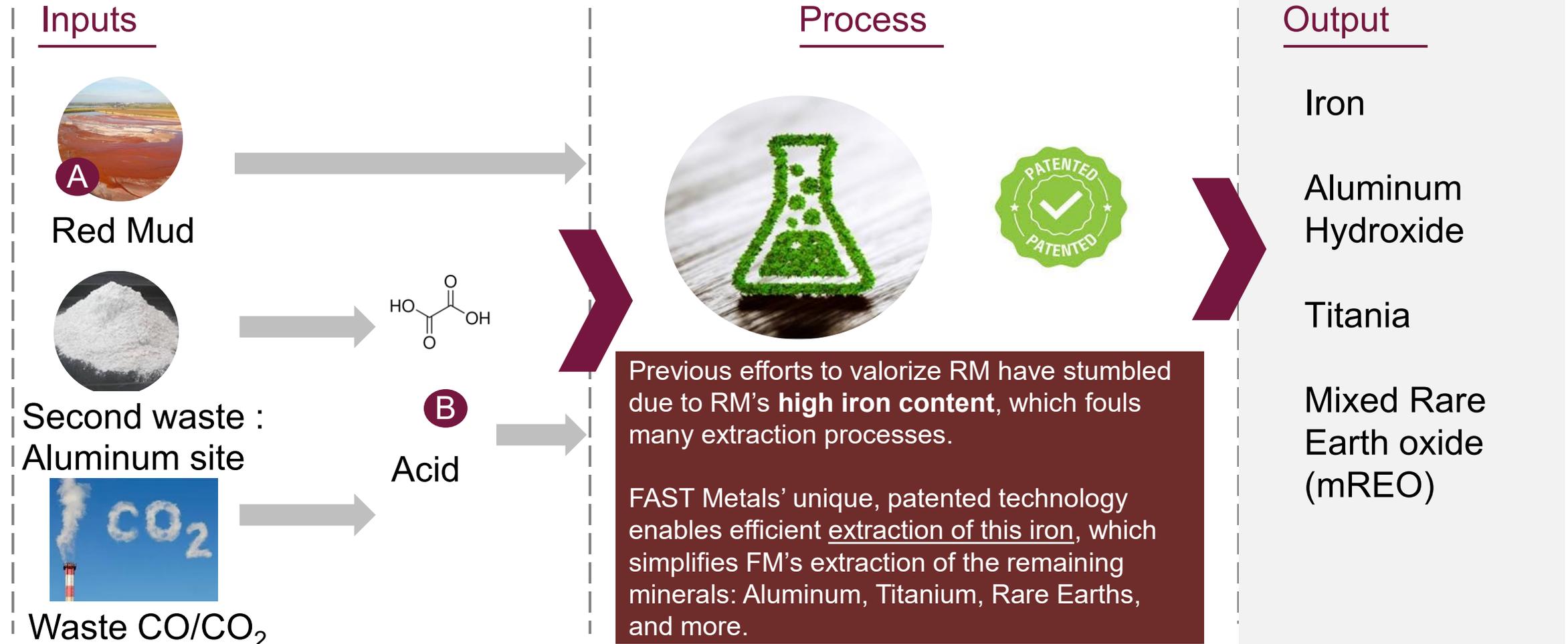
270 Million Tons of Titania



30 Million Tons of mREO

# Solution

## Circular Solution to Extract Metals From Red Mud

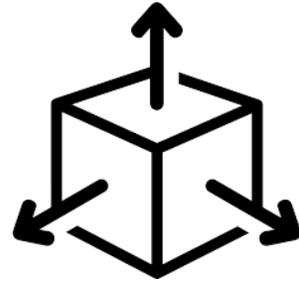


# Unique Value Proposition

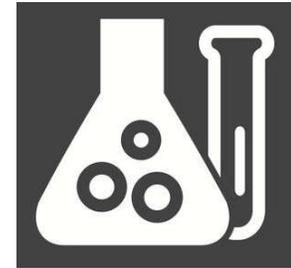


> \$ 800 / ton  
revenue

> 50 % Margin



Low cost, off-the-shelf,  
modular equipment



Mild Reaction  
conditions:

Low Temperature

Ambient Pressure

Low energy  
consumption



1.5 t of CO<sub>2</sub>  
abatement per  
ton of waste Red  
Mud

# Where are we now?



2025 - 2026

Go to Market



2025

✓ 20 kg scale

## 1. Technology:

- ✓ • 20 kg Deployment of Tech
- ✓ • 4 red mud samples
- Pilot Validation of Technology (150 kg/day): Q2'26

## 2. Commercial:

- ✓ • Binding paid-pilot & revenue agreement with Metalox

## 3. Fundraising:

- ✓ • \$ 935K secured: Angels, CVCs and non dilutive
- \$2.2 Million round TS secured with New Climate Ventures leading

## Partners

RioTinto

FOUNDERS  
FACTORY.

Activate



METALOX  
ENGINEERING



Greentown Labs ACCEL  
Advancing Climatetech &  
Clean Energy Leaders

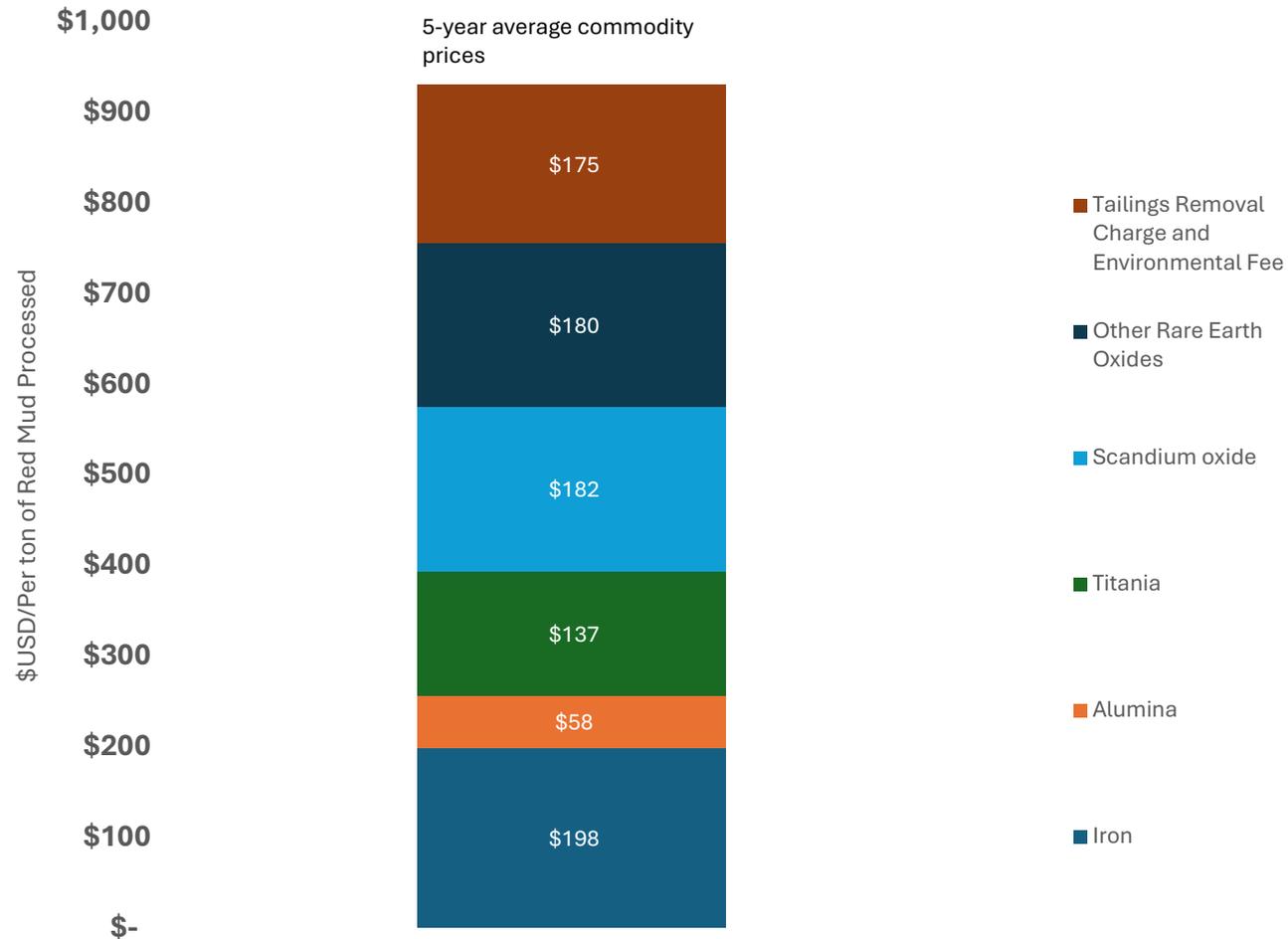


COLORADO SCHOOL OF  
MINES



WPI

# Unit Economics



- Recoveries:
  - 96% for Fe
  - 85 % for Al
  - 80 % for Ti
  - 75 % for Sc
- OPEX is \$ 280 USD/ ton of Red Mud
- 80% (\$755/ton) of revenue is derived from core business activities and 20% (\$175/ton) is from fees
- Fees include tailings and waste removal fees for red mud and the secondary waste stream, which is used as a reagent in FM's process

\*Metal prices used to derive revenue is from S&P Global, [www.metal.com](http://www.metal.com), USGS, Argus

# First Paid Pilot, 2026



20 kg Current Scale



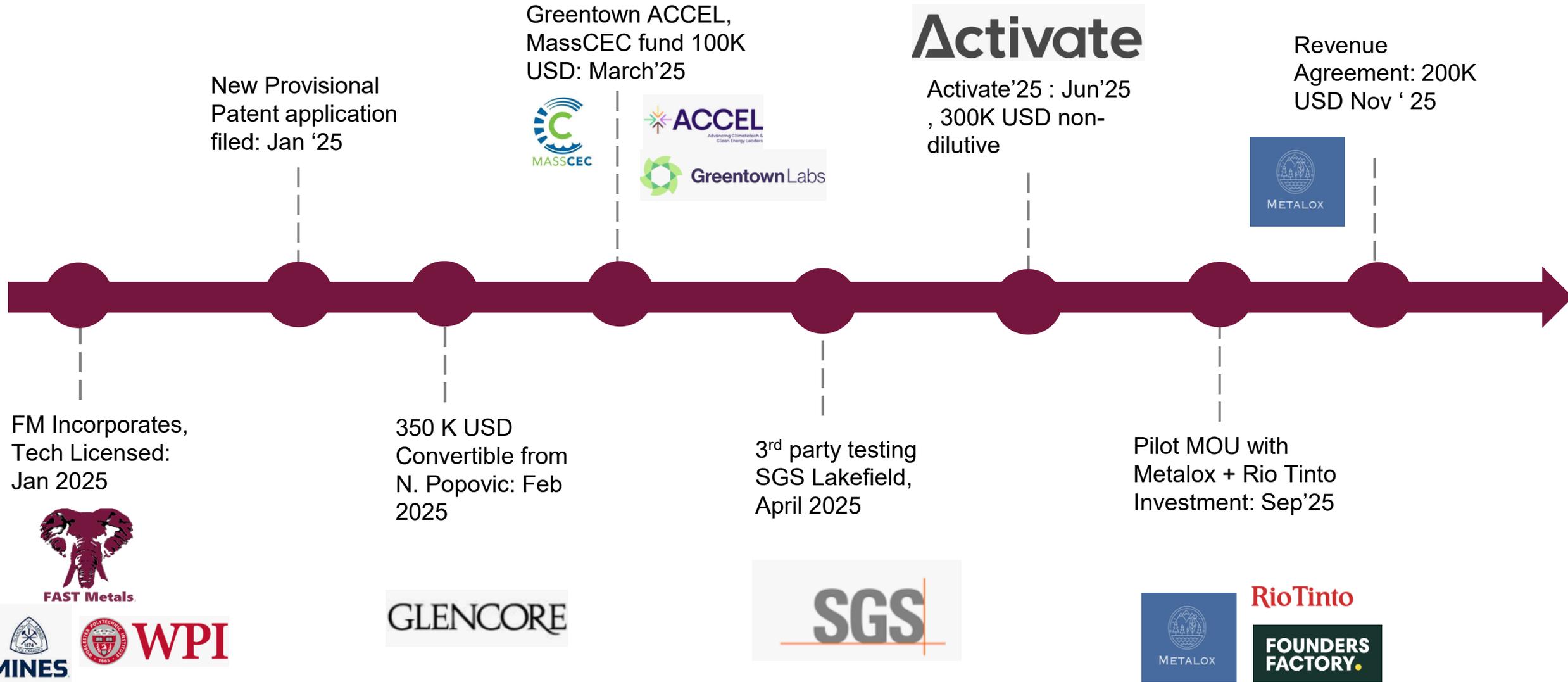
150 kg/day;  
Q2'26



METALOX  
ENGINEERING

- No cost to FAST Metals: free space, equipment
- \$ 200 K revenue agreement
- Targeting further licensing royalty revenue in 2027

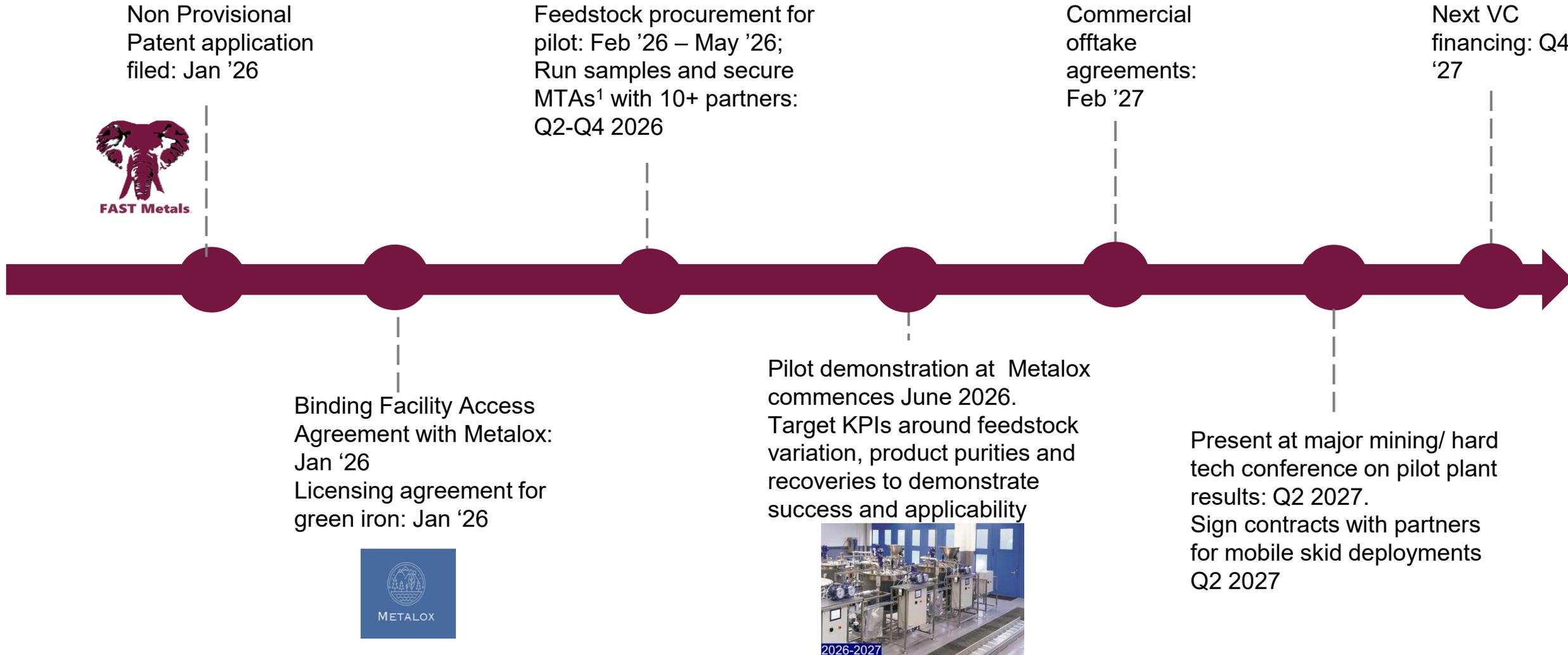
# Fast Metals Milestones (2025)



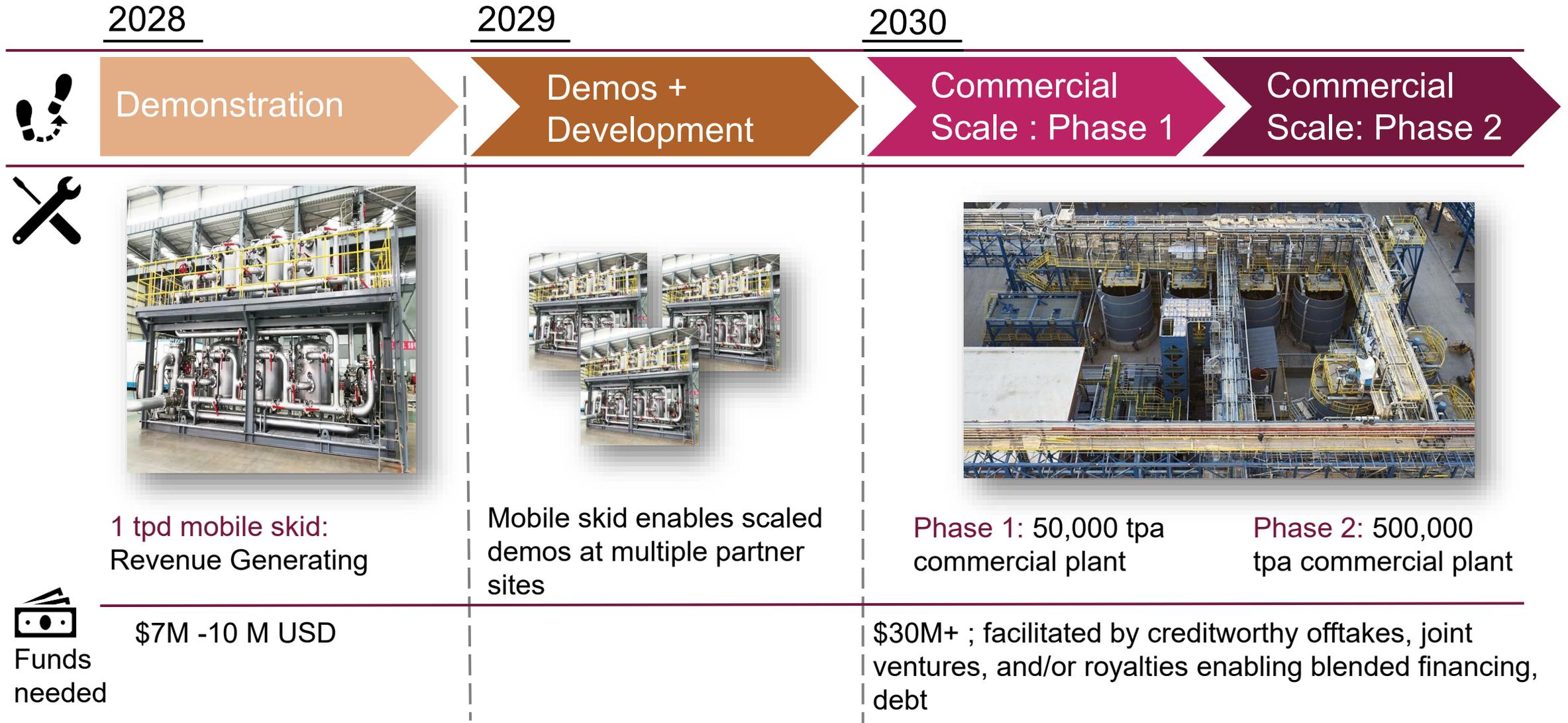


# Fast Metals Milestones (2026-2027)

## Process Scale up and Commercial offtakes, Contracts



# What will we do next?



# Platform technology

Red mud is FM's beachhead market, given its abundance and attractive waste-to-value economics. But FM's proprietary extraction tech is a broader platform technology that can expand to many other waste streams.

Initial proof point: licensing executed with Metalox for iron extraction from gallium waste

Additional feedstocks where FM's tech applies:

- EAF dusts: Iron and Zinc Extraction
- NdFeB permanent magnet recycling from auto and turbines: Iron and REE extraction
- Ti Industry waste: Iron and Ti extraction
- Zn refinery waste: Zn, Ga, Ge extraction
- Lean grade iron ore

Enables iron production and value additions from complex waste streams; no C, H<sub>2</sub> or electricity required



# Competitive Analysis



Headquarters



Metal Revenue per ton

755 \$

526 \$

464 \$

60 \$

300 \$

81 \$

Elements Extracted

Fe, Al, Ti, REEs

Fe (impure) , Al, REEs

Fe (impure), REEs (impure)

Magnetite not saleable

Fe intermediate, REE

Sc (impure)

Technology

Hydrometallurgy, low CAPEX

Hydrometallurgy needing high CAPEX for ammonia and chloralkali plants

Molten Salt Electrolysis for REE (High CAPEX)

Pyrometallurgy reduction of red mud to magnetite.

Pyrometallurgical flowsheet with Fe problems affecting purities

Crude Hydrometallurgy extraction of 20 % Sc<sub>2</sub>O<sub>3</sub>.

Scalability

Scaled locally, mobile skid

Overengineered reactor

Not applicable

Not applicable

# The Ask



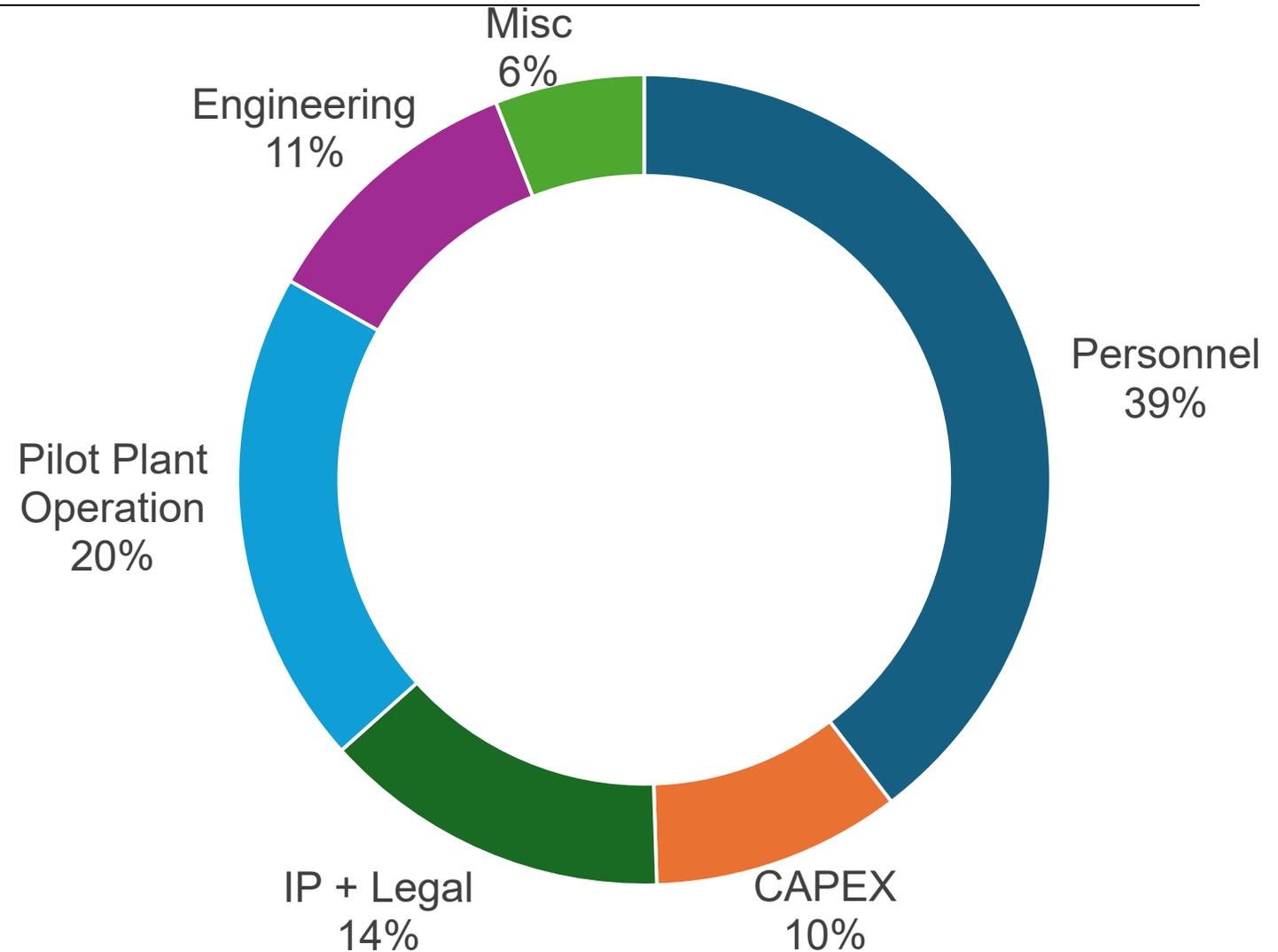
First VC round: \$2.2M on SAFE with \$11M post money cap / 20% discount, led by New Climate Ventures

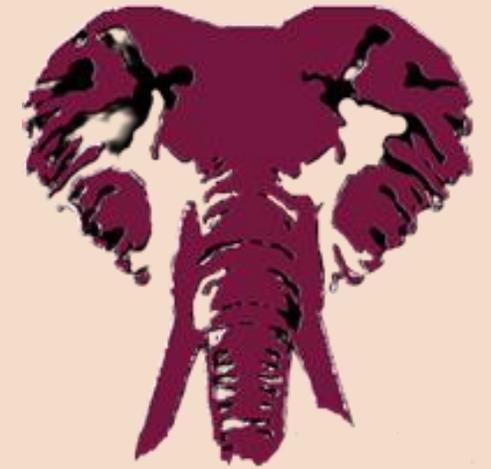
\$935K of prior funding secured – Activate, Rio Tinto, angels and non-dilutive

\$200 K USD revenue signed

Open to:

- Investment Partners
- Feedstock Partners
- Mineral Offtake Partners





**FAST Metals**

# Thank you

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Dr. Sumedh Gostu, Dr. Anthony Staley



# Market + Customer Discovery



<b>Products</b>	Iron powder or Magnetite powder (TAM: 1600 Billion USD in 2022)	Aluminum Hydroxide/Alumina (TAM: 46 Billion USD in 2022)	Titanium Dioxide/Titania (TAM: 27.9 Billion USD in 2022)	Mixed Rare Earth Oxide (mREO): (TAM mREO 6 billion USD in 2023)
<b>Use cases and applications</b>	High volume applications to produce DRI feeding steel plants, Electrical steel Low value additive manufacturing applications, electrodes for iron air batteries, LFP (Premium),	Aluminum is a lightweight metal uses extensively as an alloy element, In the renewable energy infrastructure, medical applications, automotive chassis ICE and EV	Light weight corrosion resistant metal. Used in aerospace, medical , chemical industries, sporting goods, pigments	Used extensively in magnets, electronics, batteries, superconductors, Photo voltaic coatings, catalysts
<b>End markets</b>	Construction, manufacturing, automobiles, aviation.	Construction, packaging, transportation, renewable energy, food	Construction, aerospace, medical, pigments and chemical	Magnets for electronics and automobiles, lighting
<b>Potential customers</b>				
<b>Large Liquid Market?</b>	Yes	Yes	Yes	Yes

# Commercialization Strategy



Model	Tolling	Full Ownership	Joint Venture
Summary	Partner pays per-ton fees to process; partner still owns red mud and products, but FM takes some % of sales	FM takes ownership of RM; partner pays no fee but receives no share of sales	Partnering with a major miner, typically with a revenue share or royalty
Benefits	<ul style="list-style-type: none"> <li>Less liability to FM</li> <li>Reduced CAPEX</li> <li>Allows for faster entry to market</li> <li>Mitigates supply chain risk</li> </ul>	<ul style="list-style-type: none"> <li>Most upside to FM</li> <li>Value creation: establish a standalone company well-known and essential in mineral processing</li> <li>Less risk of losing control of IP / tech</li> </ul>	<ul style="list-style-type: none"> <li>Technical expertise</li> <li>Operational resources</li> <li>Able to leverage balance sheets, credit rating of large partner</li> </ul>
Drawbacks	<ul style="list-style-type: none"> <li>Less upside, as FM gets smaller % of sales</li> <li>Third party dependence limiting control</li> </ul>	<ul style="list-style-type: none"> <li>Most liability to FM</li> <li>CAPEX will be solely FM's responsibility</li> </ul>	<ul style="list-style-type: none"> <li>Technology/information transfer</li> <li>Operational control</li> <li>Cultural Clash</li> </ul>
Strategy	To be used during skid stage (2028/2029)	Can be used at any time during FM's growth and will determine how capital is raised	To be used in commercial scale (2029)

# CO<sub>2</sub> Abatement Impact



1 ton of BR processed in our solution abates 1.43 ton of CO<sub>2</sub>

Bauxite Residue composition :39% Iron, 8% Titanium Ore (Rutile), and 24% Alumina

CO<sub>2</sub> Reduction in our solution:

- 80 % CO<sub>2</sub> reduction for Iron compared to incumbent Iron production (1.88 t of CO<sub>2</sub>/t of Fe), 50 % CO<sub>2</sub> reduction compared to incumbent Alumina production (1 t of CO<sub>2</sub>/t), 50 % CO<sub>2</sub> reduction to incumbent Titania production (1.5 t of CO<sub>2</sub>/t)
- CO utilization from power plants (before after burners) to produce oxalic acid

4 billion Tons of BR, annual generation @ 150 million Tons pa.

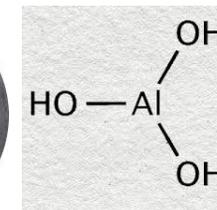
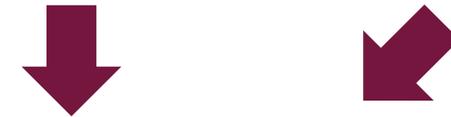
10 % of annual production (150 million Tons of BR): 15M tons BR

\*1.43 tons CO<sub>2</sub> = 21M tons CO<sub>2</sub> per annum

10% of legacy inventory of red mud processed with FM: 400 Million Tons RM, i.e. 572 Million Tons of CO<sub>2</sub>



Waste CO/CO<sub>2</sub>



# Where other approaches fall short



Failure Mode	Summary	Example Companies	FM's Solution
Partial valorization	Incomplete extraction of various metals present in Red Mud (e.g. iron only, titanium only)	RUSAL	Complete extraction of various constituents: REEs, Iron, Alumina and Titania.
Impure products	Products (such as REE) produced with impurities due to red mud's high iron content	Element USA	FM de-ironing technology removes iron up front, enabling straightforward production of high purity products from other constituents
High costs	High CAPEX and OPEX via to expensive reagents, custom equipment, or high energy (pyrometallurgy or electrochemistry)	Geomega	FM sources key reagents from on-site waste streams; uses off-the-shelf vs. custom equipment; and uses hydrometallurgy vs. pyro / electro processes, keeping energy use low
Overly sensitive to feedstock variation	Highly selective chemical processing means that results are highly dependent on the geographical source / elemental composition of red mud	Phoenix Tailings	FM's solution has been tested on multiple feed sources from different geographies; FM's targeting of 4+ commodities with liquid markets allows monetization of different constituent mixes