

11 June 2024

Calix ZESTY Investor Presentation

Sydney, Australia | 11 June 2024 – Australian environmental technology company, Calix Limited (ASX: CXL) (“Calix” or “the Company”) is pleased to provide a copy of its investor presentation for the online briefing on Tuesday, 11 June 2024 at 10am AEST, that will provide an overview of the Zero Emissions Steel TechnologY (ZESTY) application and will be hosted by Chief Executive Officer and Managing Director Phil Hodgson.

Zesty is an enabling and complementary technology for multiple decarbonisation pathways for iron and steel and represents one of the largest addressable markets for the application of Calix’s unique core technology platform.

Registration for the event can be made at the following link below:

<https://events.teams.microsoft.com/event/99293a56-5f77-4134-ae9f-a0b906e783e2@41eb501a-f671-4ce0-a5bf-b64168c3705f>

Investors will be able to submit questions during the briefing using the Q&A function.

The briefing will also be made available on our website: <https://calix.global/investor-centre/> after the event.

-ENDS-

This announcement has been authorised for release to the ASX by:

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About Calix

Calix Limited (ASX: CXL) is an environmental technology company solving urgent global challenges in industrial decarbonisation and sustainability.

Calix's unique patented core platform technology delivers efficient indirect heating of raw materials to enable renewably powered mineral processing and efficient capture of unavoidable industrial emissions.

With strong and increasing demand driven by global commitments to net-zero emissions, Calix is applying its core technology to the decarbonisation of cement, steel and alumina, sustainable processing of critical minerals, direct air capture of atmospheric carbon dioxide, and sustainable environmental products.

Each application of the technology is being deployed through a proven licensing, joint-venture and spin-out model. Subsidiary businesses focused on a specific application and target market accelerate commercialisation and enable a flexible equity funding model to support exponential growth.

Leveraging its core platform technology and a global network of partners, Calix is urgently developing multiple environmental businesses that deliver positive global impact. Because there's only one Earth.

Mars is for quitters.

calix.global

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Zero Emissions Steel Technology

Investor Briefing

11 June 2024

Important Disclaimer

This presentation has been prepared by Calix Limited (ABN 36 117 372 540) ("Company").

SUMMARY INFORMATION

This presentation contains summary information about the Company and its subsidiaries ("Calix") and their activities current as at 11 June 2024. The information in this presentation is a general background and does not purport to be complete.

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All dollar values are in Australian dollars (\$) or A\$) and financial data is presented as at or for the full financial year ended 30 June 2021, unless stated otherwise.

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Investor briefing
11 June 2024

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Agenda

Calix investor webinar – Zero Emissions Steel TechnologyY

1	Key Highlights
2	Introduction to Calix
3	Technology Status
4	Industry Opportunity
5	Commercialisation Strategy
6	Q&A



Investor briefing
11 June 2024



Key Highlights

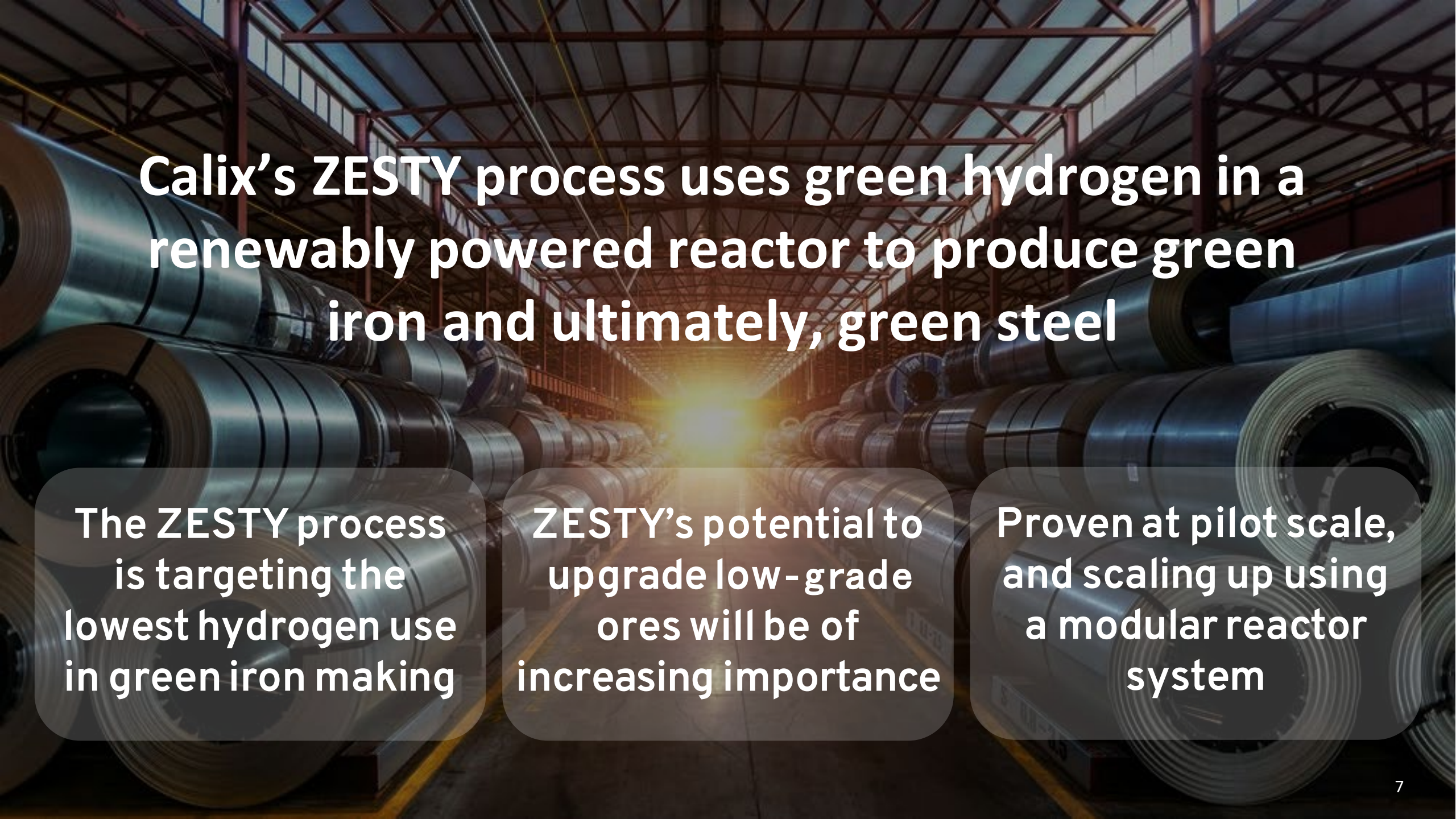


**Iron and steel are essential to our
economic prosperity and continued
development**

**The iron and steel industry is responsible for
~8% of global CO₂ emissions, with ironmaking
being one of the most carbon intensive and
hard-to-abate processes**

**~80% of the iron and steel
industry's CO₂ comes from
iron production**

**Countries representing 90% of
global GDP now under net zero
commitments**



Calix's ZESTY process uses green hydrogen in a renewably powered reactor to produce green iron and ultimately, green steel

The ZESTY process is targeting the lowest hydrogen use in green iron making

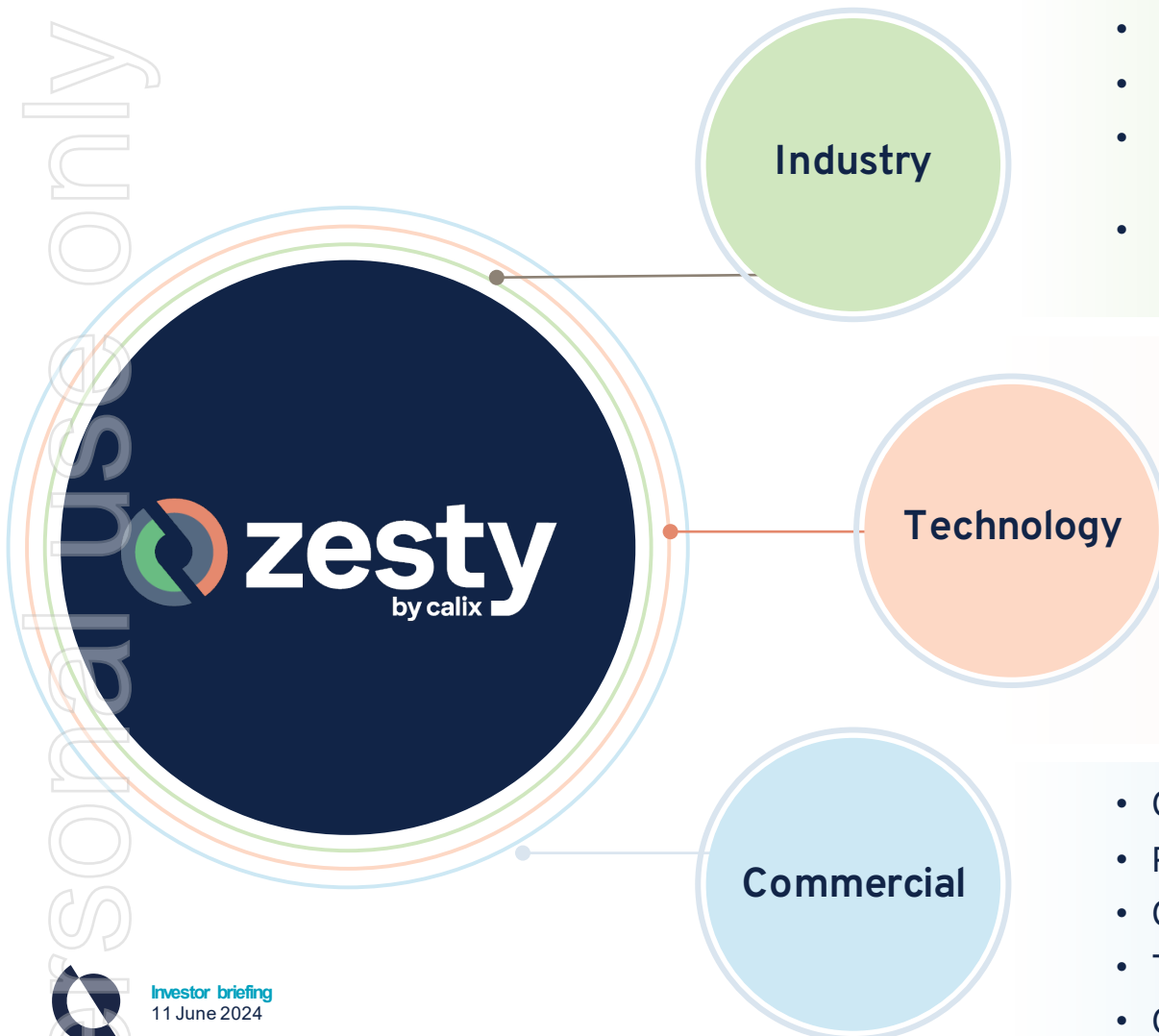
ZESTY's potential to upgrade low-grade ores will be of increasing importance

Proven at pilot scale, and scaling up using a modular reactor system

Key highlights

Decarbonising iron & steel with ZESTY

es only
use
as
only
use
as
only
use
as



- One of the world's largest decarbonisation opportunities
- ZESTY's total addressable market could reach ~US\$5.9bn p.a. in 2050
- Iron and steel accounts for 2.8bn tonnes of CO₂ emissions annually, ~8% of global CO₂ emissions
- ~80% of the iron & steel industry's CO₂ footprint is associated with the production of iron from iron ore

- Proven pilot – green iron production from low grade Pilbara ores
- Clean & efficient electric heating
- Targeting minimum possible hydrogen use
- Compatible with fines / waste material
- Removes costly processing steps
- Green iron product can be briquetted
- Extensive testing at pilot scale & patent protected

- Capital-light business model with licensing royalties
- Potentially attractive economics even without carbon pricing
- Can enable multiple decarbonisation pathways for iron & steel
- Track record of successful focused technology spin-offs
- Collaboration with major iron ore producers & steelmakers

Introduction to Calix



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MARS IS FOR QUITTERS



2005
FOUNDED



UNGC
signatory
= SINCE 2020 =

120+
employees



A\$120m
technology investment



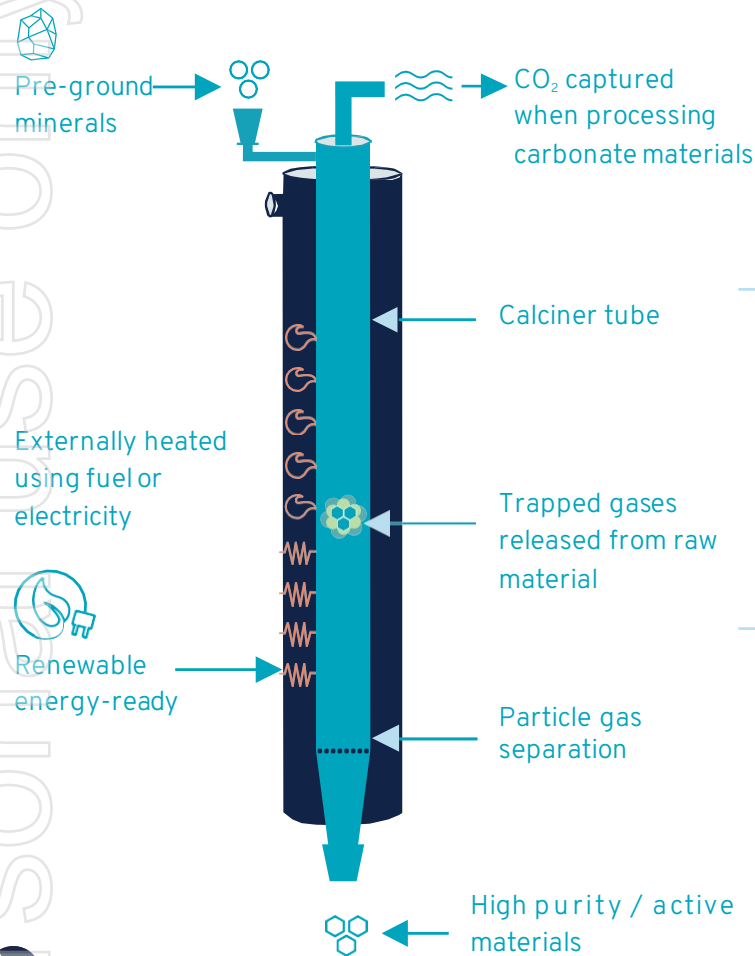
9 operational
SITES

28
PATENT
families


ACTIVE IN
7 5
countries continents

Calix's core platform technology


A new way to “heat stuff up”




CARBON CAPTURE

 
Unavoidable process CO₂ emissions from cement and lime production and CO₂ from the atmosphere are captured for use or storage.


ELECTRIFICATION & RENEWABLE ENERGY-READY

 **Sustainable Processing**
Compatible with electricity and alternative fuels to provide viable, flexible and economical pathways to sustainable processing.


HIGHLY-ACTIVE MATERIALS

 **Magnesia**
Produces high purity / active materials with enhanced chemical and/or bioactivity.












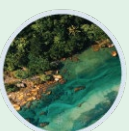















28

patent families covering core technology & applications. 11

Calix's structure underpins a solid foundation for growth

One core technology with multiple applications for global industries.

Platform output	 Carbon Capture		 Sustainable Processing			 Magnesia
Business subsidiary			Pilbara Minerals JV 			
Applications	 Cement & lime	 Direct Air Capture	 Lithium	 Alumina	 Iron & steel	 Water  Ag / Marine / Bio
Market Size	1.4 BTpa CO ₂ ¹	Targeting > 1 BTpa CO ₂ ⁷	US\$7Bpa ²	US\$45.5Bpa ³	US\$640Bpa ⁴	~US\$100m ⁵ Multi-US\$Bpa ⁶
Partners	      					 
Revenue model	Licence fees (\$ per tonne CO ₂)		Licence fees (% Total Revenues)			Growing direct / distributor sales

1. GCCA 2050 Net Zero Global Industry Roadmap
2. Estimated as 50% of total lithium market as measured by lithium carbonate equivalent (LCE) derived from spodumene - <https://www.mckinsey.com/industries/metals-and-mining/our-insights/australias-potential-in-the-lithium-market>
3. Alumina global market revenue estimated at <https://www.precedenceresearch.com/press-release/alumina-market#:~:text=The%20global%20alumina%20market%20size,combination%20of%20aluminum%20and%20oxygen.>
4. Estimated as US\$400 per tonne of iron @ 1.6BTpa <https://www.statista.com/statistics/589979/metal-content-of-the-global-iron-ore-production/>
5. US magnesium hydroxide market management estimate, caustic replacement market likely several multiples of this
6. Frost and Sullivan – Independent Market Report – Calix IPO Prospectus 2018
7. Heirloom statement in press release <https://fox40.com/news/local-news/san-joaquin-county/heirloom-carbon-technologies-tracy-co2/>



Green mineral processing solutions for multiple industries

Multiple applications built & under development

1 Magnesia



Bacchus Marsh
Commissioned 2013
(50,000 tonnes per annum¹)

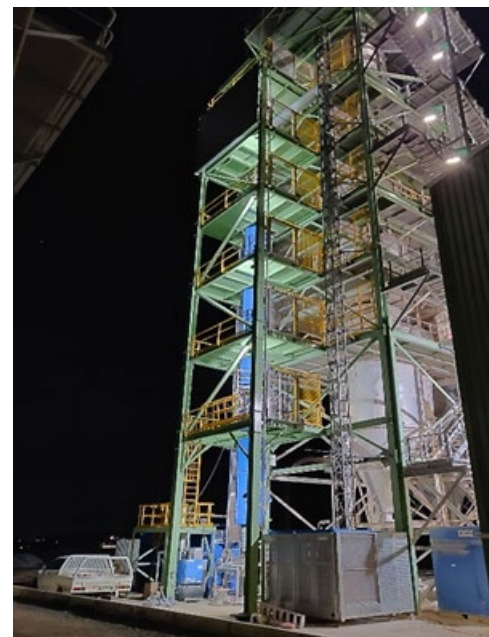
2 Cement & Lime



Belgium – “LEILAC-1”
Commissioned 2019
(50,000 tonnes per annum¹)



3 Alumina, lithium & critical minerals



Victoria, Australia
Commissioned 2019
(2,000 tonnes per annum¹,
fully electric and renewably powered)

4 ZESTY – Green Iron and Steel



Location TBD
FEED Study complete
(30,000 tonnes per annum¹ fully
electric)

Technology status



Zero Emissions Steel Technology (ZESTY)



Renewably-Powered

The whole system, including the reactor, can be powered by renewable electricity



Lower grade ores

Proven ability to process lower grade ores, including Australian hematite / goethite



No Fluidized Beds

Powder-based process suitable for processing of iron ore ultra-fines and fines (up to 0.5mm)¹, without fluidized beds: a highly simplified process



No Pelletisation

No requirement for iron ore fines pelletisation, avoiding significant capital and energy costs



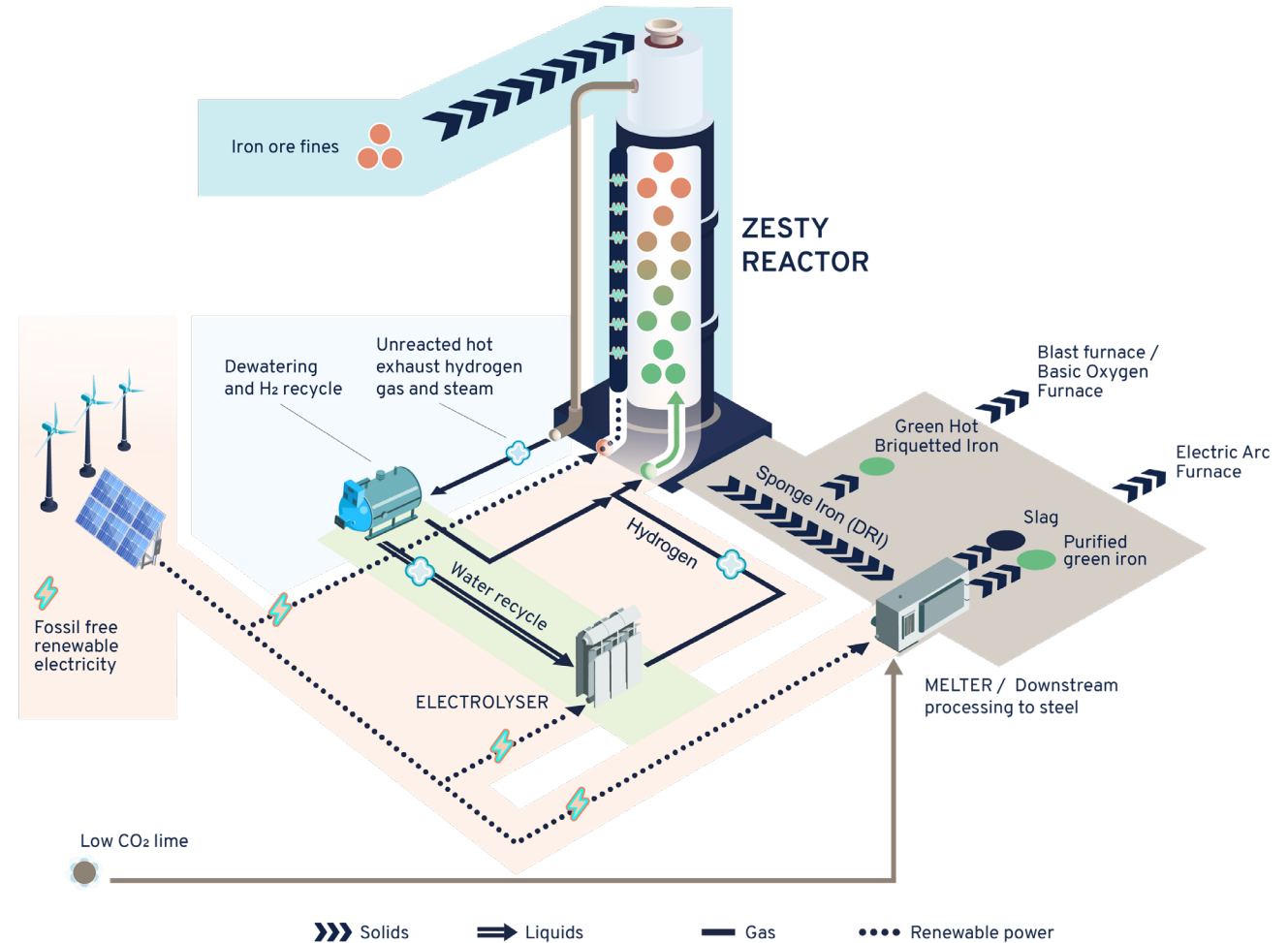
Minimum Hydrogen Consumption

Targets theoretical minimum hydrogen use, through no use of hydrogen for combustion and through recycling of unreacted hydrogen



Scalable & Flexible

Ability to scale production relatively easily, using electric-powered reactor modules



Process flow for 30kTpa ZESTY green steel production



ZESTY's key points of difference

ZESTY has several inherent advantages over other hydrogen reduction and green iron / steel technologies in development

Green iron and steel technology	Simple process (low pressure / no fluidised beds)	Compatible with fines & lower-grade ores	No fossil fuel requirement	No CCS requirement	H ₂ not combusted / easily recycled	Examples
	✓	✓	✓	✓	✓	
Carbon Capture	✓	✗	✗	✗	✗	Numerous small scale trials underway
Smelting Reduction	✓	✓	✗	✗	✗	HISARNA - Tata, 2010, 65ktpa, multiple campaigns
Fluidised Beds	✗	✓	✓	✓	✗	HYFOR (Pilot) FINMET (2m tpa - BHP - dismantled) CIRCORED (300ktpa, Trinidad - shut down)
Shaft furnace with reducing gas	✓	✗	✗	✗	✗	DRI-Midrex H ₂ , H2 Green Steel Hybrit
Flash iron making	✓	✓	✓	✓	✗	University of Utah - Lab-scale
Microwave reduction	✓	✓	✓	✗	n/a	Biolron (Rio Tinto) - Lab-scale
Electrolysis	✓	✓	✓	✓	n/a	Electra, Boston Metals - Lab-scale

Proven at pilot scale

ZESTY ore testing results

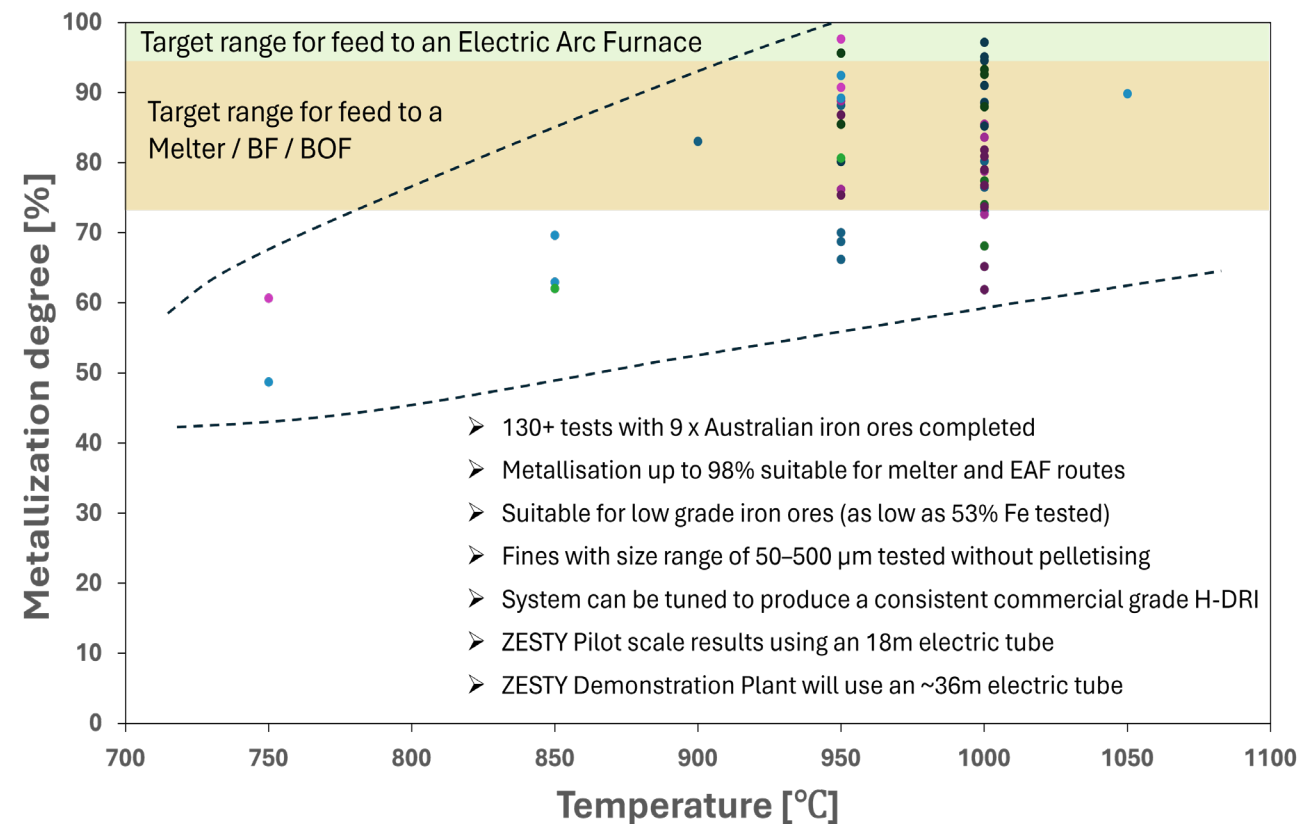
✓ ZESTY proven at pilot scale, with metallisation rates up to 98%

✓ H_2 -DRI produced from Australian hematite/goethite ores
~ 50% of global iron ore supply and not compatible with electric arc steel-making

✓ ZESTY H_2 -DRI fines have been successfully briquetted into a green HBI product with highly encouraging properties



Side profile of HBI produced from ZESTY H_2 -DRI briquetted at 200 MPa, 800 °C (scale: each square is 0.5x0.5 cm)



Metallisation Degree = Fe Wt% = the percentage of iron by weight in the ore

ZESTY's compelling techno-economics

Demonstration Plant FEED study

Pilot testing and FEED study completed



130+

Tests completed



9

Australian ores variants tested



75-98%

Metallisation degree



0.9 – 1.3 MWh

per tonne of HBI – highly efficient



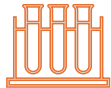
US\$410-520

per tonne of HBI production cost



Near ZERO

emissions



Scalable

Multiple tubes for modular scale-up



ARENA Grant

Broader Australian government support

Techno-economics findings

- ✓ ZESTY could produce green HBI at costs close to the range of conventional (carbon intensive) HBI production¹
- ✓ ZESTY could reduce the emissions intensity of reducing iron ore to metal iron from 1.89 tonnes of CO₂ / tonne of iron to near zero
- ✓ No pelletisation and sintering = considerable capital and operating expenditure savings
- ✓ Low consumption of green hydrogen = approaching theoretical minimum for reduction
- ✓ Efficient electrical indirect heating methodology
- ✓ Economics expected to improve further with scale
- ✓ Including the cost of carbon would further enhance economics

1. Assumes access to wholesale renewable electricity pricing of A\$36-48/MWh

Towards FID for a ZESTY Demonstration Plant

ZESTY FEED study completed for a 30,000 tpa green iron demonstration plant



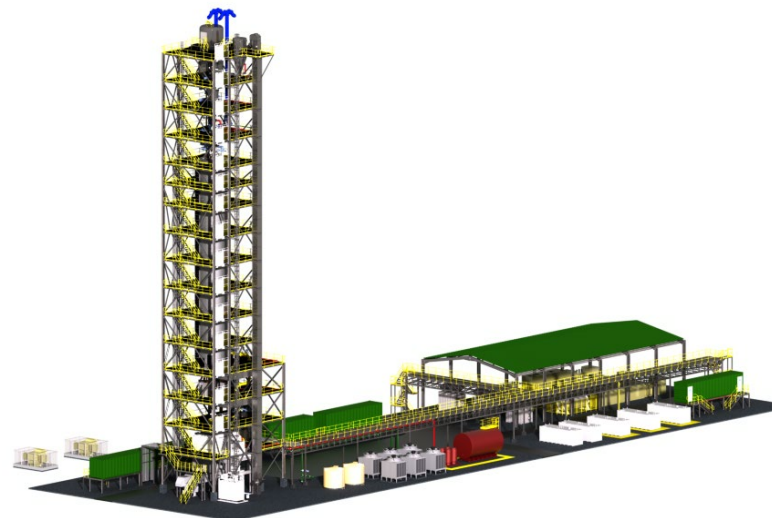
A\$947,035 ARENA grant covering
~50% of FEED costs

The FEED study has finalised inputs to a final investment decision, subject to financing, including:

- Site layout, environmental and permitting considerations
- Process design including operating regimes, venting, emergency response
- Major equipment sizing and costings
- Construction methodologies

Why 30,000 tpa demonstration is the right next step?

- ✓ Represents full-scale implementation of a single reactor tube – the basis for further scale-up
- ✓ Capable of processing sufficient H₂- DRI / HBI for further downstream testing (steelmaking) at full scale to validate the product



The ZESTY commercial demonstrator is targeting BF-BOF suitable HBI produced from low grade iron ore

The demonstrator aims to charge a tolling fee to iron ore producers to test HBI trial products with their customers

ZESTY commercial demonstration – next steps

A demonstration facility would target cost recovery from test campaign fees and sales of the green iron product.

Engineering, procurement & construction (EPC)



Detailed Engineering targeting completion FID + 18 months

Construction targeting completion FID + 30 months

Commissioning and demonstration



FID + 30 months onwards



Commissioning / testing phase ~ target 4 months

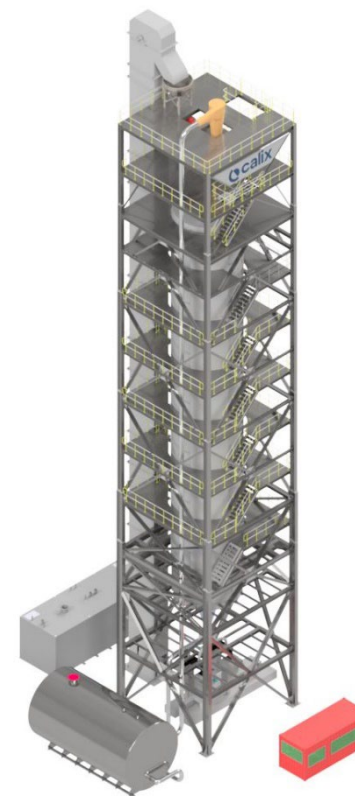


Operational proving phase target ~8+ months (leading to permanent use as a test unit / demonstrator for the ZESTY business)

Commercial pipeline and engineering revenue



As with our experience with Leilac, our plan is to build a commercial pipeline in parallel with demonstration and commence charging engineering fees for project studies



The ZESTY commercial demonstrator will be similar scale to the LEILAC-1 plant for cement and lime

4

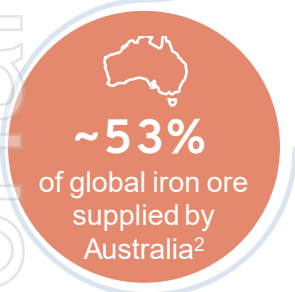
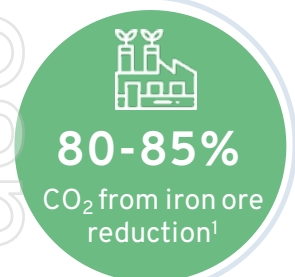
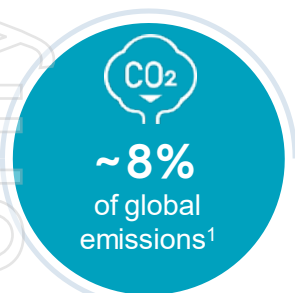
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Industry opportunity



Decarbonising iron and steel

Indispensable, carbon-intensive & hard-to-abate



Decarbonisation solutions should:

- Enable multiple decarbonisation pathways
- Be compatible with multiple ore types
- Minimise supply chain disruption
- Leverage existing assets
- Deliver efficient use of energy, reductant & raw material
- Be easily scalable

Australian iron ore

- >A\$150b or ~44% of Australian resources export earnings³
- 96% of Australian iron ore is hematite / goethite⁴
 - not compatible electric arc steel-making
- Value-add & value creation opportunity
 - iron ore → green iron & steel

SDG Impact



Multiple drivers accelerating iron & steel decarbonisation

ZESTY’s potential is being propelled by several significant tailwinds to net zero

1

Iron and steel CO₂ emissions continue to increase...

2.8 billion tonnes (direct)

per year – an estimated 8% of the global total¹

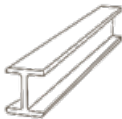


2

Iron and steel production remains a significant contributor to CO₂ emissions...

~80%

of the iron and steel industry’s CO₂ footprint is associated with the production of iron from iron ore²



3

Acceleration in the demand for green iron...

~50%

estimated reduction in blast furnace production from 2019 to 2050 as the industry decarbonises³



4

Strong global government support, with policy driving the need for green iron...

90%

of global GDP now under net zero commitments⁴



5

Significant capital has been set aside to decarbonise industry...

US\$39tn (Sep 2023)

assets of signatories to the ‘2022 Global Investor Statement to Governments on the crisis’⁵



6

US\$275tn of investment required to reach net zero by 2050...

US\$275tn (Jan 2022)

estimated spend required by 2050 to fund the global energy transition⁶



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11 June 2024

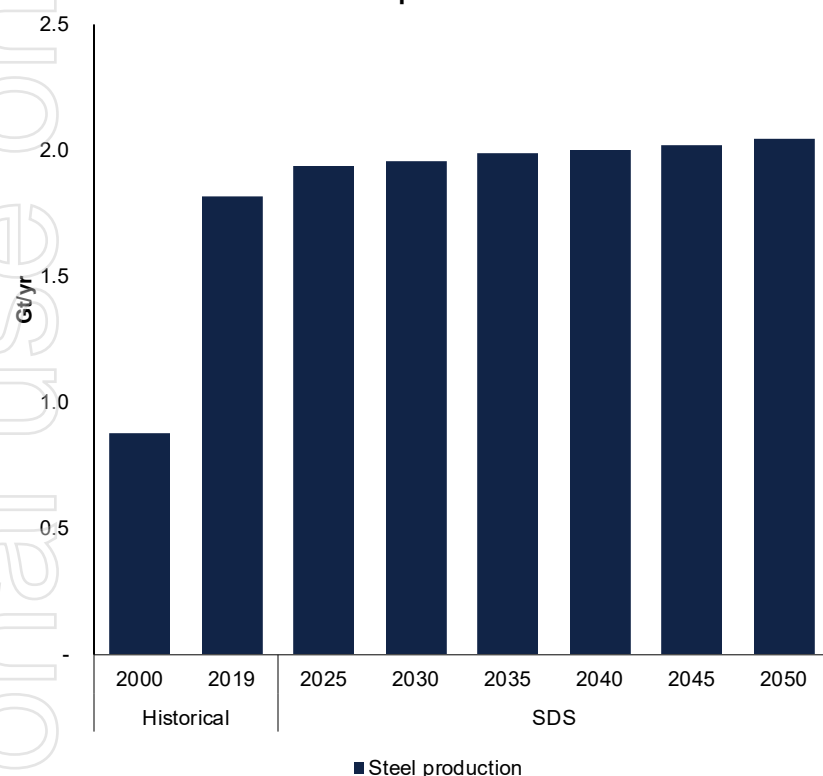
Source: (1) IEA Emissions Measurement for NetZero Steel Apr 2023 (2) Climate change and the production of iron and steel. World Steel Association. 2021 (3) IIMA BFBOF paper from May 2022 using IEA SDS Scenario data (4) sciencebasedtargets.org (5) IIGGC.org (6) The net-zero transition. What it would cost, what it could bring. McKinsey Sustainability

Outlook for world iron and steel production

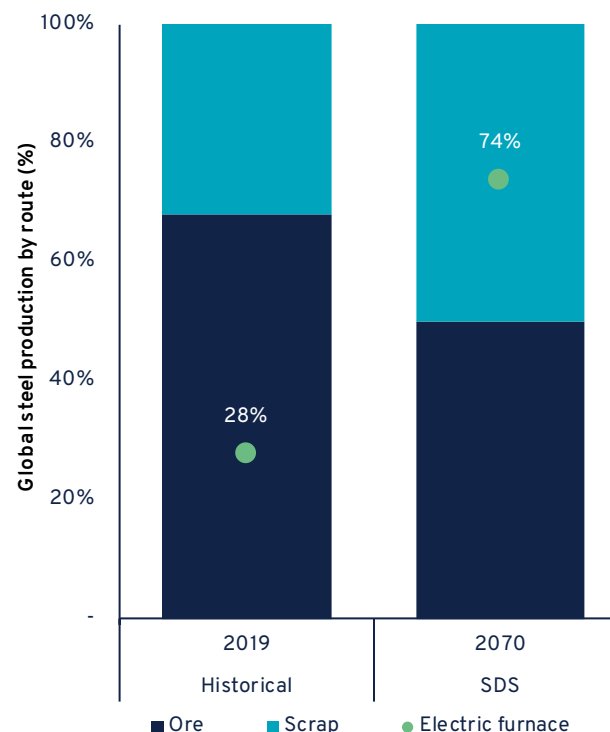
Whilst steel is expected to grow modestly to 2050 and iron production plateauing, under the IEA's Sustainable Development Scenario, the mix of production technology is changing with an increasing proportion becoming decarbonised

Global steel production expected to continue to rise...

Steel production

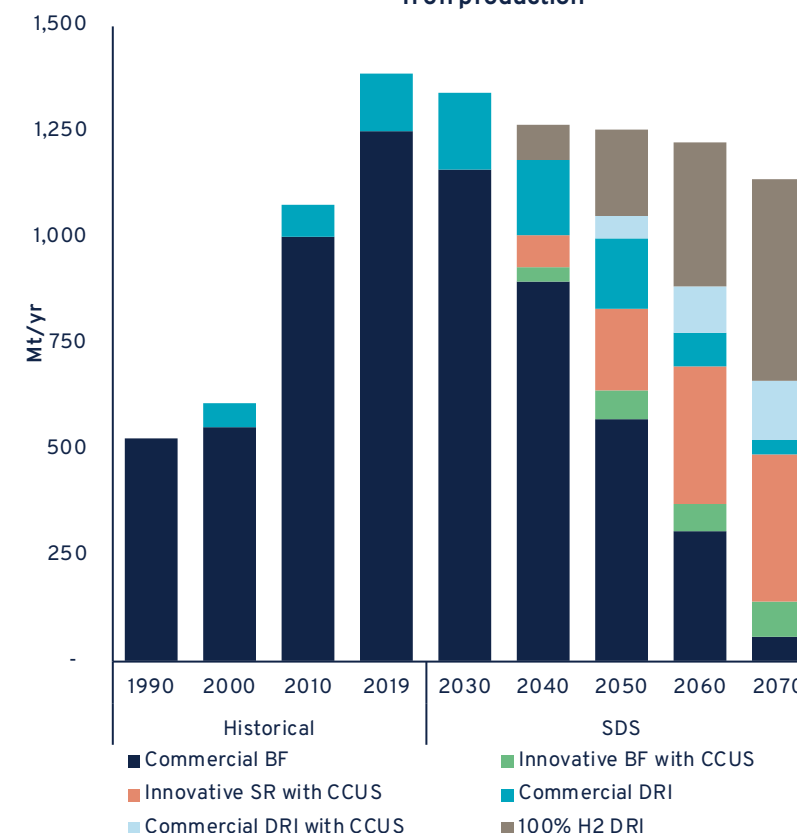


Scrap expected to increase as a proportion of steel production...



Global iron production to shift towards new technologies...

Iron production

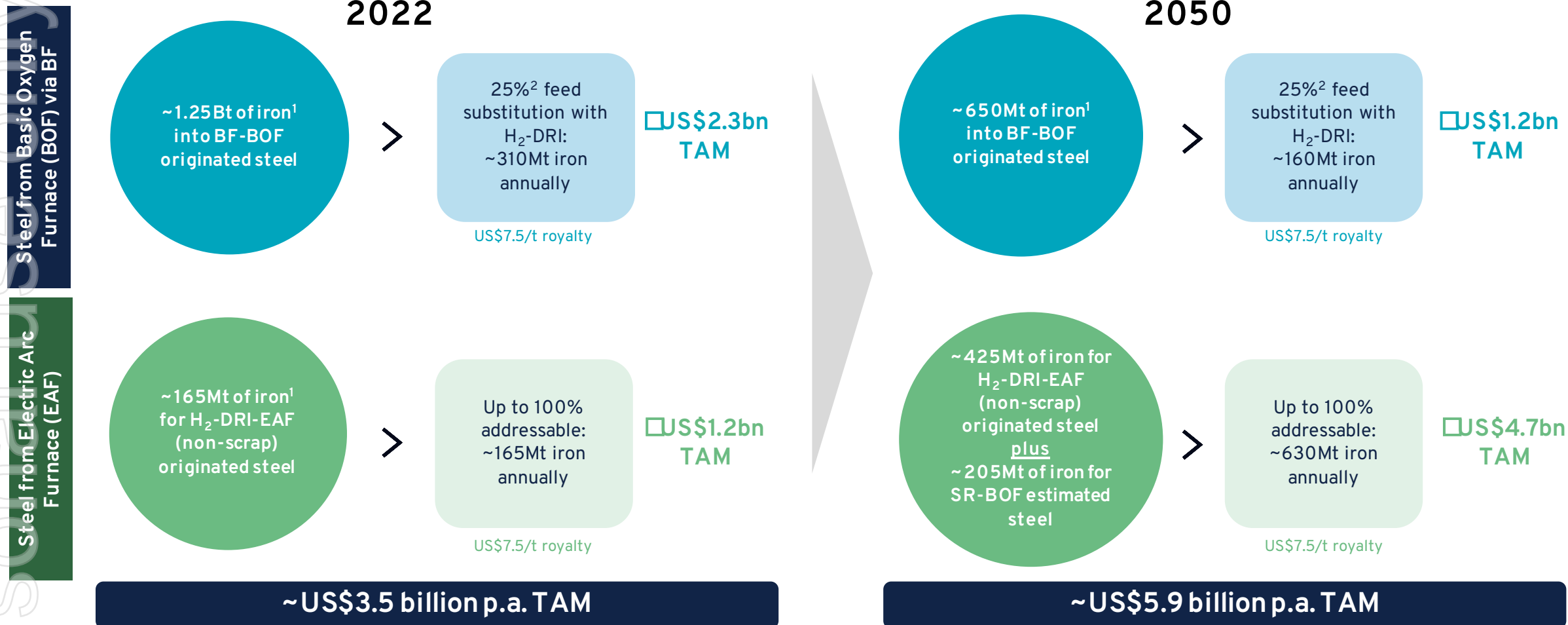


Source: IEA Iron and Steel Technology Roadmap: Sustainable Development Scenario (SDS) for 2050 (2020)
Note: Iron production excludes scrap-based steelmaking

1.3bn³ tonnes of expected global iron demand in 2050 → equivalent to ~4,300+ ZESTY H₂-DRI modules of 300ktpa

ZESTY total addressable market could be up to ~US\$5.9bn p.a.

If ZESTY can achieve a royalty of US\$7.5 / tonne green iron² (2% of HBI value), this indicates a total addressable market (TAM) of ~US\$3.5bn in 2022, growing to ~US\$5.9bn in 2050



Notes: IEA SDS scenario, Worldsteel, Calix analysis, Fiscal Year Australia (FY) from 1 July to 30 June; CY stands for Calendar Year in which most Market data (e.g. IEA data) is expressed
Sources: (1) Assumed that the global steel production has an average 97% Iron mass content. In 2022 the global actual steel production was 1.88 Gtpa, of which 71.5% or 1.35 Gtpa Oxygen/BOF in absolute terms, and 0.53 electric/EAF. source Worldsteel (2) Assumed royalty rate is at ~ 2% of average HBI value of USD 410 /tonne

Commercialisation strategy



Who are we working with?

Multi-year, multi-project \$200m decarbonisation development program

HILTCRC

Heavy Industry
Low-carbon Transition

<https://hiltcrc.com.au/>

zesty | **calix**
by calix

CORE PARTNERS



AFFILIATE PARTNERS



KEY PARTNERS

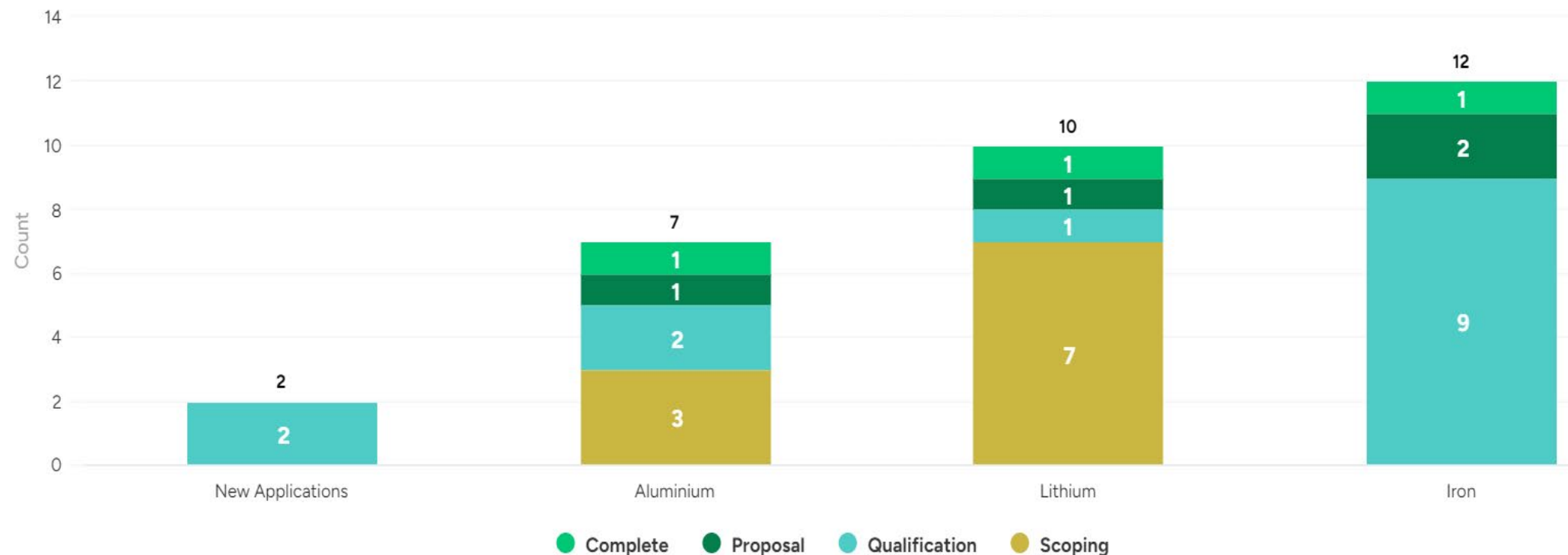


Investor briefing
11 June 2024

Commercialisation Pipeline

Our sustainable processing opportunity pipeline continues to grow across multiple applications

- 1st study packages completed across our top 3 prioritised mineral sectors
- Multiple Iron Ore work programs now qualified following the successful expanded ore testing campaign during FY24
- Proposal volume for further Iron Ore testing and study programs expected to increase during FY25



Capital-light business model

ZESTY intends to adopt a capital-light business model for commercialisation, with royalty fees paid under a technology licence

Overview

Licensing technology to third party iron and steel manufacturers (“Producers”)

Following demonstration, producers to construct their own plants, reducing capital requirements for Calix & enabling technology to be easily commercialised & scaled

Licensing strategy underpins a partnership approach to collaborate with iron and steel producers for an industry-wide solution

	Business model options			
	Capital intensive		Capital light	
	Own & operate	Build then transfer	Third party finance	Licence technology
Plant owner	ZESTY	Producer	Third party financier	Producer
Plant operator	ZESTY	Producer	Producer	Producer
Plant constructor	ZESTY	ZESTY	Third party EPC contractor	Producer / Third party EPC contractor
Capital required from ZESTY	Significant permanent capital	Significant temporary capital	Low / none	Low / none
Responsible for sourcing capital	ZESTY	ZESTY & Producer	ZESTY (from third parties)	Producer
Scalability	Limited	Limited	High	High

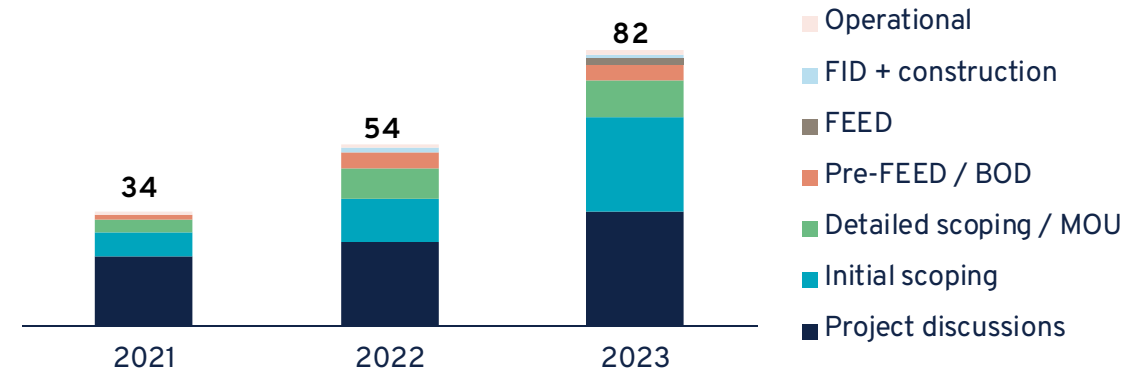
Demonstration and growth funded via spin out

- Calix has experience in successfully spinning out technologies like ZESTY – attractive to private capital
- Calix successfully “soft” spun out (7%) Leilac in 2021, valuing Leilac at €215m post money, plus 30% of all Leilac royalties to be paid to Calix
- Since then, Leilac has progressed substantially, both technically and commercially

Overview

- Leilac represents significant potential to decarbonise the cement and lime industries
- Cement and lime contribute ~8% of global emissions and are one of the largest and hardest-to-abate sources of global CO₂ emissions
- Rising global carbon prices create strong tailwinds that support an industry-wide transition to the Leilac process

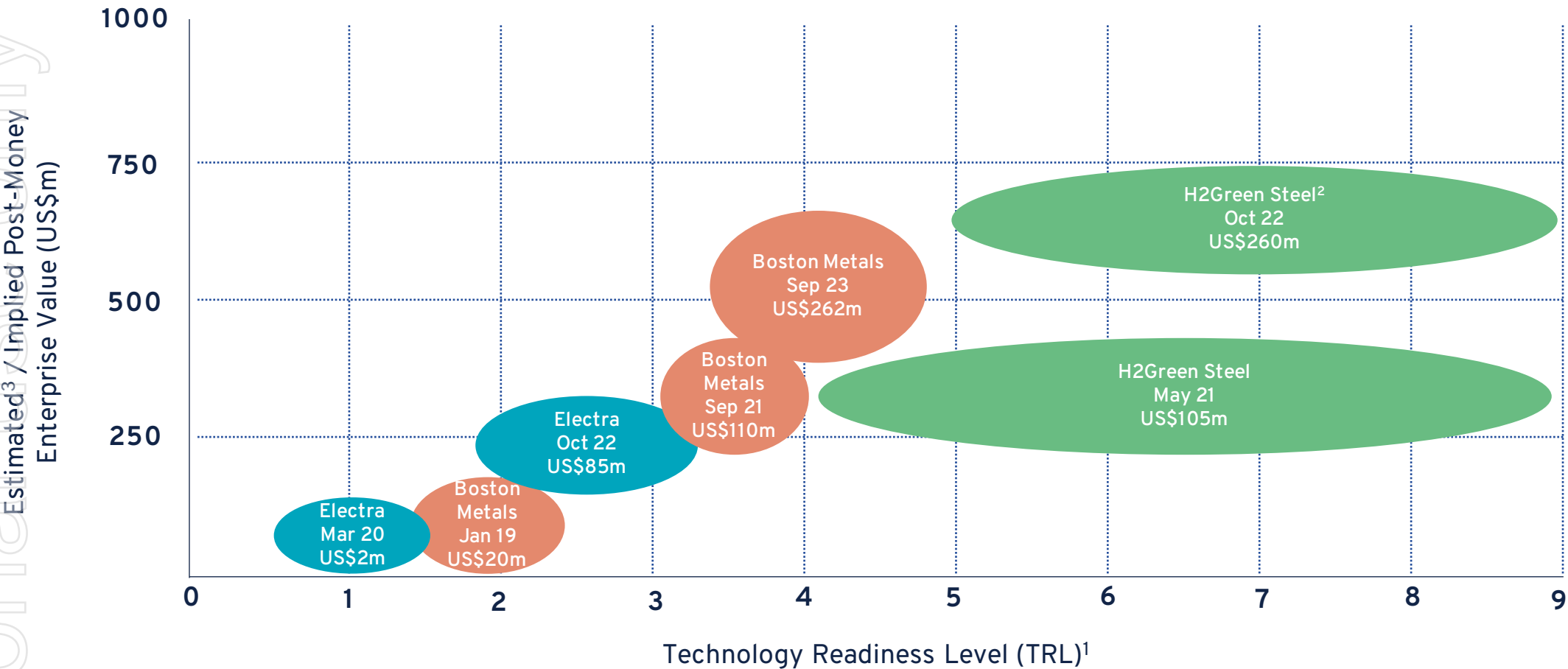
Leilac Project Pipeline (# projects)



Multiple blue-chip and global partners



Significant valuations have been achieved for green iron / steel technologies



1. TRL is based upon management estimates given reported data on testing equipment / status and <https://www.estep.eu/assets/Uploads/210308-D1-2-Assessment-and-roadmapping-of-technologies-Publishable-version.pdf>

2. Utilising Midrex technology = TRL9 for nat gas, lower TRL estimate for high hydrogen input is management estimate based upon (lack of) public data both from Midrex and Hybrit (modified Midrex process)

3. Where public data is not available, estimate is 25 to 40% dilution which is conservative-case based upon averages <https://www.saastr.com/carta-the-actual-real-dilution-from-series-a-b-c-and-d-rounds/#:~:text=20%25%20dilution%20in%20an%20A,much%20you%20need%20the%20money>

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Key takeaways

ZESTY presents a significant growth opportunity for Calix leveraging its unique patented platform technology to develop scalable decarbonisation solutions for the iron and steel industry

- Estimated total addressable market of up to US\$5.9bn p.a. (2050) – one of the world’s largest industrial decarbonisation opportunities
- Growing demand, driven by government policies and the need for scalable & cost-effective decarbonisation solutions
- Capital-light royalty-based revenue model from iron and steel producers licensing the ZESTY process
- Calix has experience in successfully raising capital and achieving look-through valuation via spin-out of subsidiaries
- ZESTY has several competitive advantages over existing hydrogen reduction and green iron/steel technologies and has been extensively tested at pilot scale



Efficient & clean electric heating



Targets minimum hydrogen consumption



Green iron from Australian Pilbara ores



Simplified & scalable process



Protected by 8 patent families

Q&A





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Glossary

Term	Meaning
BF-BOF	Blast Furnace / Basic Oxygen Furnace – the most prevalent steelmaking technique in the world today, using coal as both a heat source and reductant
Calciner	A term describing a kiln or furnace - typically used in the mineral processing industries
CCS	Carbon Capture and Storage
CFC	Calix Flash Calciner – technical term for Calix’s core technology
DRI	Direct Reduced Iron – a product derived from the removal of oxygen from iron ore to form metallic iron in the solid state (without melting, as is the case in the blast furnace)
EAF	Electric Arc Furnace – a process to make and recycle steel at very high temperatures using electricity as the heating source
FEED	Front End Engineering and Design
H ₂ -DRI	The process of directly reducing iron ore to metallic iron (DRI) with hydrogen as the reductant
HBI	Hot Briquetted Iron, referring to briquetted DRI or H ₂ -DRI, “bricks” of relatively high purity iron ready for steelmaking
IP	Intellectual Property
Process CO ₂ Emissions	CO ₂ emissions that evolve from heating limestone or calcium carbonate (CaCO ₃) to make lime or calcium oxide (CaO)
Reductant	A substance that carries out reduction (i.e. oxygen removal), in converting iron ore to iron
Reduction	The chemical process of removing oxygen – in this instance removing oxygen from iron ore (largely iron oxide) to make metallic iron
SR	Smelting Reduction – a combination of the iron reduction process with iron melting (and possibly purification) process
TAM	Total addressable market
Tpa	Tonnes per annum
TRL	Technology Readiness Level (NASA Scale)
Ultrafines	Tiny particles, typically smaller than 0.15 to 0.2 mm (150 to 200 microns) in diameter
ZESTY <small>investor briefing</small>	Zero Emissions Steel TechnologY – brand name for Calix’s green iron / steel application of its core technology

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**Mars is for
quitters**

