

# SCRAP SUPPLEMENTS & ALTERNATIVE IRONMAKING 10



Zero Emissions Steel TechnologY (ZESTY):

*from Proof of Concept... to Demonstration Plant*

Orlando, Florida, USA

9 - 11 March 2026

## About Calix

Calix Limited is a technology company solving global challenges in industrial electrification and decarbonisation.

Calix's patented core platform technology is being developed to deliver indirect heating of raw materials to enable efficient, precise, flexible and renewably powered metal and mineral processing and capture of unavoidable industrial emissions.

With demand driven by global decarbonisation commitments, Calix is applying its core platform technology to the cement, steel, alumina, magnesia, critical minerals and carbon dioxide removal industries.

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

### Mars is for quitters

#### SOLVING GLOBAL CHALLENGES

Electrification of industrial processing  
Capture of unavoidable emissions  
Sustainable environmental solutions



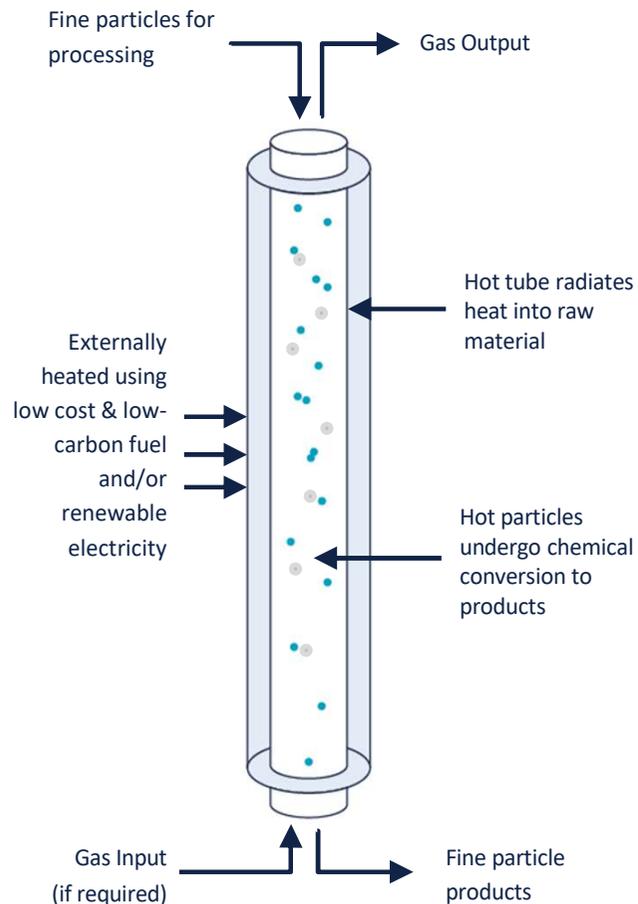
#### ONE PLATFORM TECHNOLOGY MULTIPLE OPPORTUNITIES

Cement & Lime  
Iron & Steel  
Alumina  
Lithium & Critical Minerals  
Carbon Dioxide Removal  
Water



# Calix's platform technology

A new way to “heat stuff up”



## What separates our technology from traditional methods of mineral processing?

### “Energy Flexible”

- traditional fuels, electric, alternative fuels
- flexible operations compatible with variable renewable energy
- electricity grid balancing opportunities

### “Gas Separation”

- CO<sub>2</sub> captured when processing limestone for cement and lime
- Minimises hydrogen use for green iron
- Keeps steam pure when processing alumina

### “Simple Operation”

- No moving parts / complex machinery
- Gentle, quiet process; low maintenance
- Easy to operate
- Temperature control, no “hot spots”



We have **29** patent families covering our core technology & its application into target markets

Our patent portfolio is regularly updated, and with each generation of our tech we protect our intellectual property (IP) and our unique value proposition

# Calix Technology proven at pilot and demonstration scale

Our pilot and demonstration plants built to date



## CFC15000

Bacchus Marsh, Victoria, Australia  
Built – 2013  
Commercial production for Calix's Magnesia business. Process demonstrator validation at commercial demonstration scale



## Leilac-1

Lixhe, Belgium  
Built – 2019  
Partner – Heidelberg Materials  
Demonstration of indirect calcination and CO<sub>2</sub> separation for cement & lime at a commercially relevant scale



## BatMn Reactor

Bacchus Marsh, Victoria, Australia  
Built – 2019  
Electric heating, R&D plant for multiple metal and mineral processing applications



## Thor's Hammer

Bacchus Marsh, Victoria, Australia  
Built – 2024  
Direct electrification lab reactor

# Towards Commercial Demonstration

Several projects underway across multiple industries

## Lithium



### Mid-Stream

#### Demonstration Plant

Pilgangoora, Pilbara, West Australia  
Construction completed Dec 2025  
Partner – Pilbara Minerals  
Production of low-carbon intensity lithium phosphate salt

## Cement



Illustration

### Leilac-2

Heidelberg Materials  
Ennigerloh, Germany  
100ktpa process CO<sub>2</sub> capture – alternative fuels  
Target commissioning 2027

## Lime



### Project ZETA

(Leilac technology)  
Location – South Australia  
40ktpa near-zero emissions lime with electric calcination and carbon capture and use of unavoidable CO<sub>2</sub>  
Target commissioning 2027

## Iron & Steel



### Zesty Green Iron Demonstration Plant

Location – Kwinana, West Australia  
30ktpa green iron – fully electric, minimal Hydrogen use  
Target commissioning 2028



European Commission

Horizon 2020  
European Union funding  
for Research & Innovation



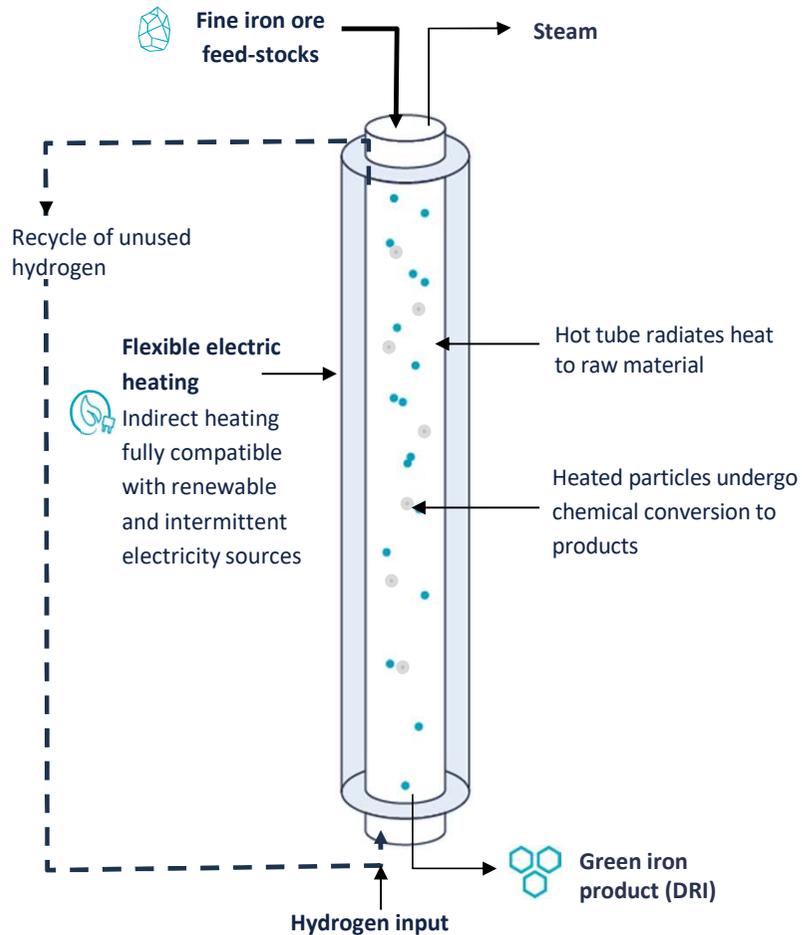
Australian Government  
Australian Renewable  
Energy Agency

**ARENA**

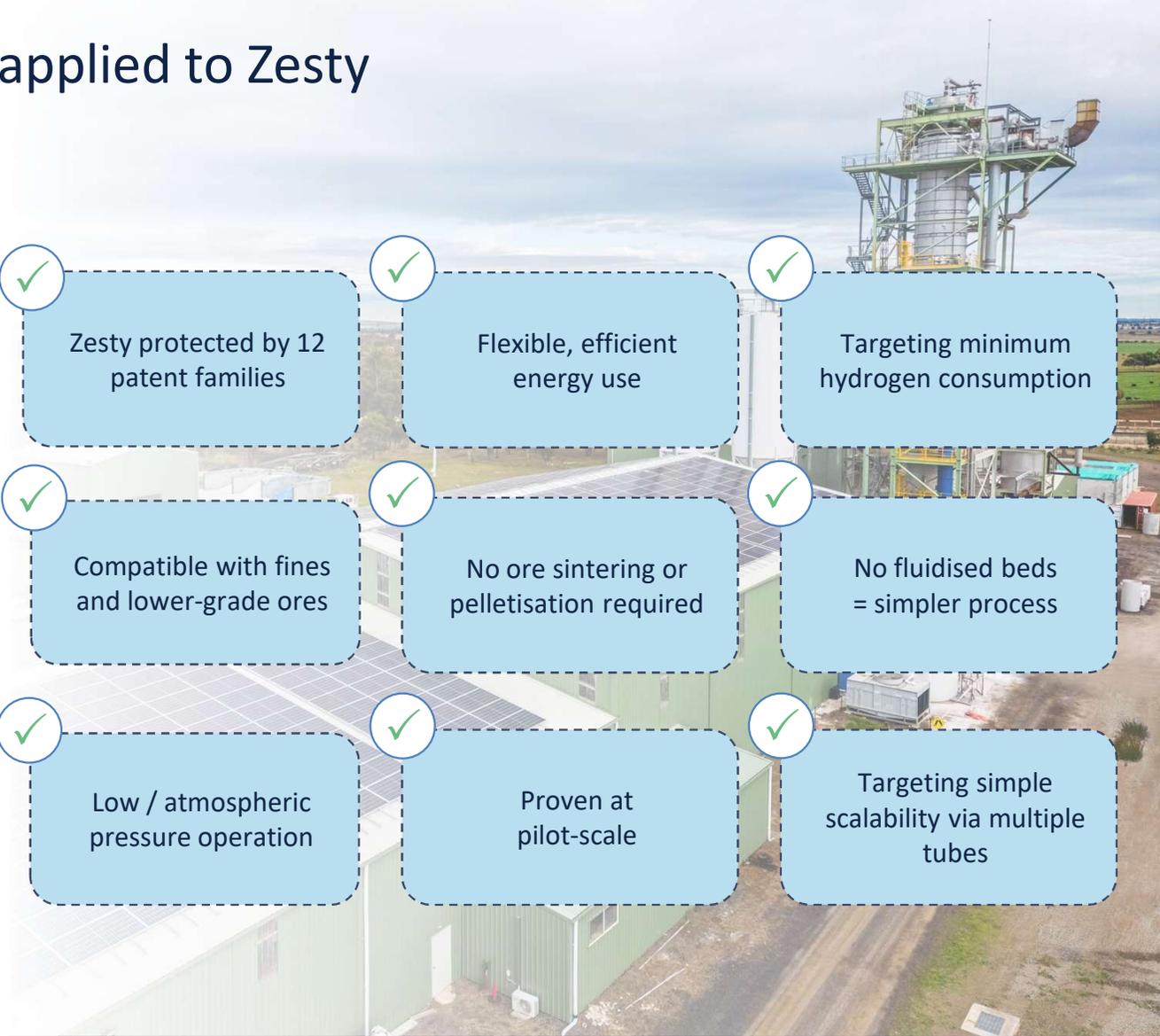
**SCRAP SUPPLEMENTS & ALTERNATIVE IRONMAKING 10**



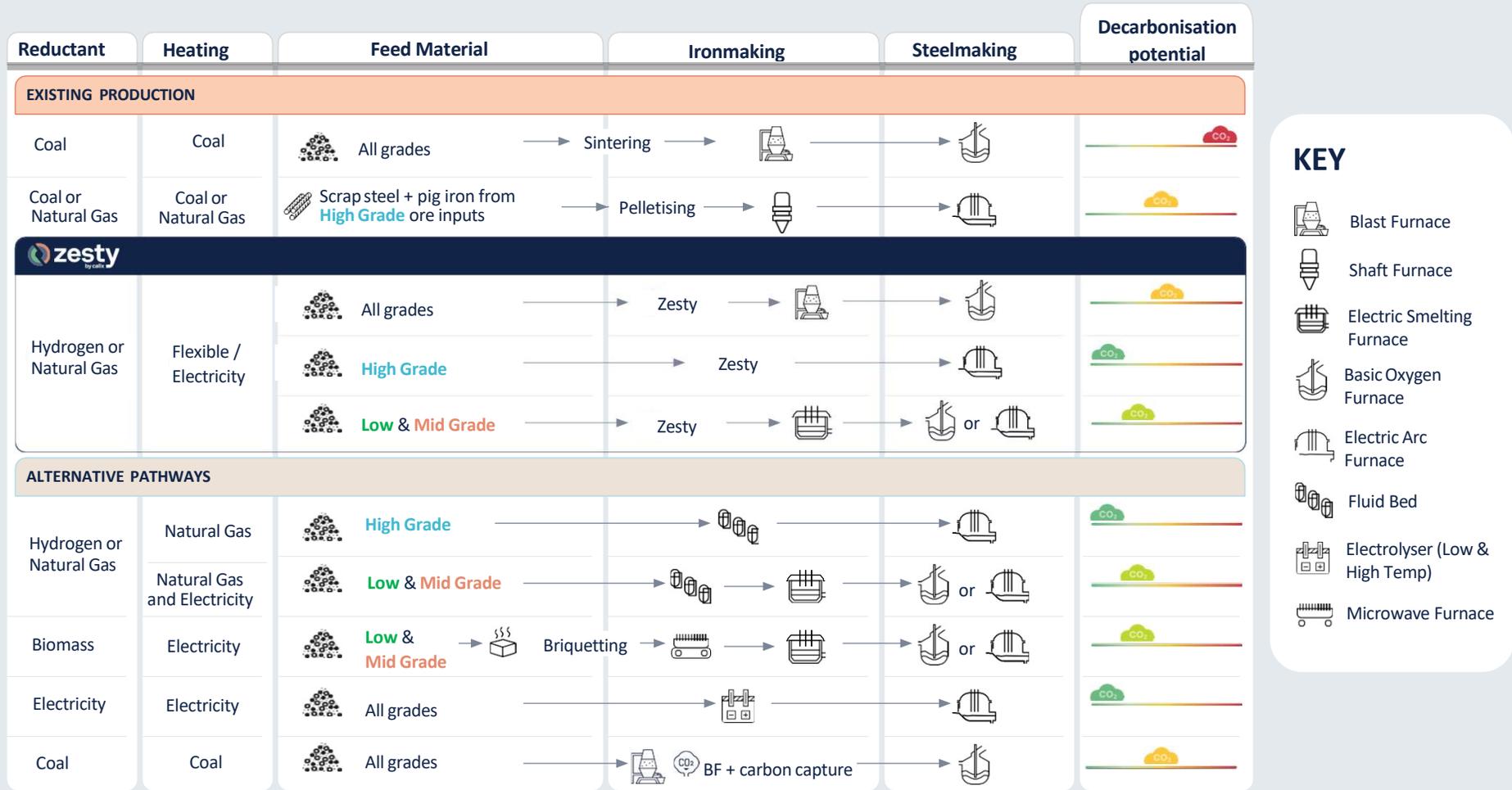
# Calix's core platform technology applied to Zesty



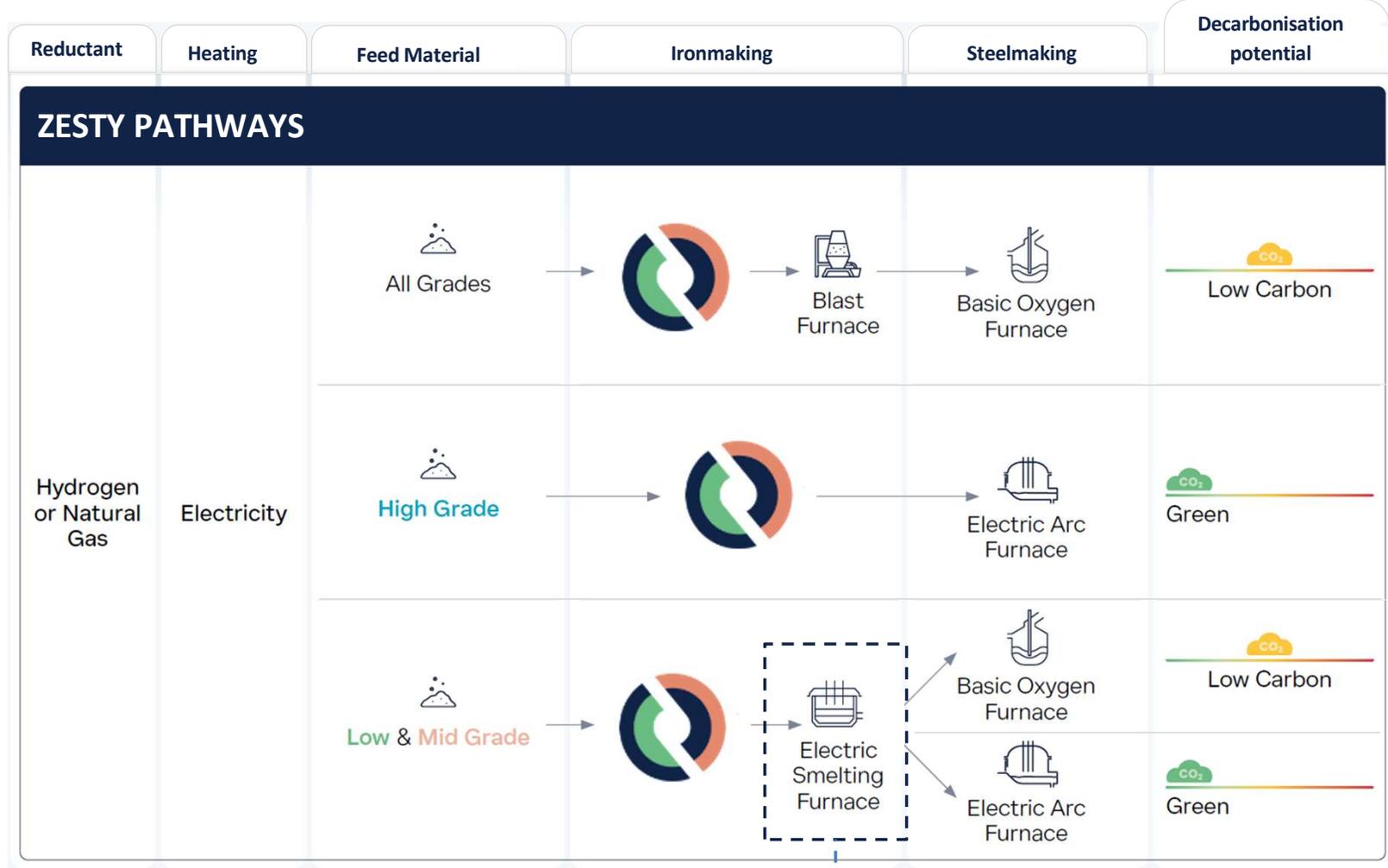
- ✓ Zesty protected by 12 patent families
- ✓ Flexible, efficient energy use
- ✓ Targeting minimum hydrogen consumption
- ✓ Compatible with fines and lower-grade ores
- ✓ No ore sintering or pelletisation required
- ✓ No fluidised beds = simpler process
- ✓ Low / atmospheric pressure operation
- ✓ Proven at pilot-scale
- ✓ Targeting simple scalability via multiple tubes



# Decarbonisation pathways for iron & steel – where does Zesty play



# Zesty decarbonisation pathways and compatible technologies



Zesty is compatible with multiple steelmaking routes

Substituting green iron into a Blast Furnace

Providing green iron with high metallisation directly to an Electric Arc Furnace

Providing green iron for smelting to remove impurities before use in a Basic Oxygen Furnace or Electric Arc Furnace e.g. NeoSmelt project<sup>1</sup>

1. ARENA. Project NeoSmelt

# Processing findings from Zesty testing and FEED study

Calix has successfully tested Zesty across multiple ores and conditions with 6 Australian producers, achieving high metallization rates

**130+**

Tests conducted through pilot plant

**6**

Australian ore producers used in FEED study

**70-98%**

Metallization rates achieved



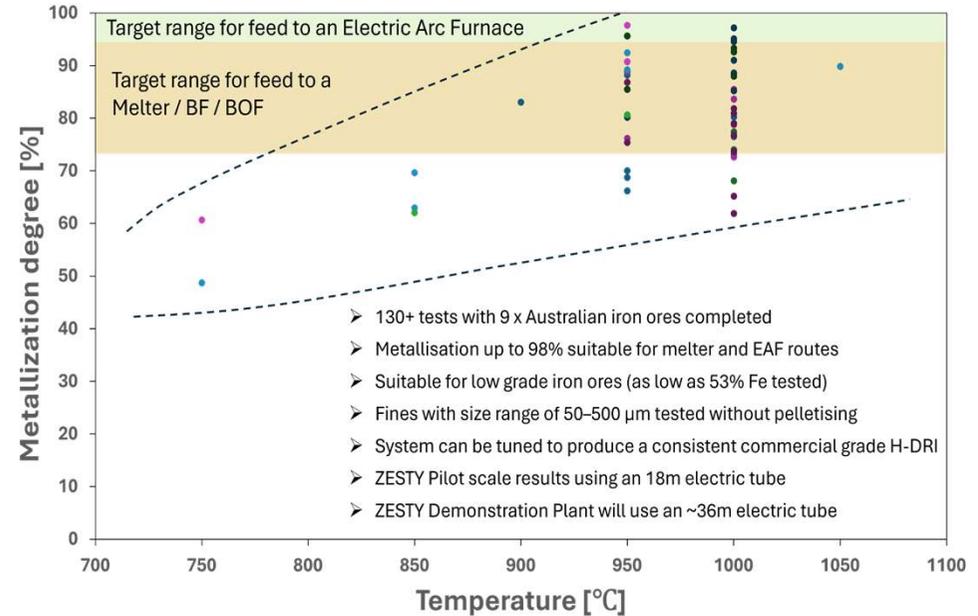
Zesty technology proved successful at pilot scale, with metallization rates well above the target of 75% for low grade ores for smelting / BF / BOF steel making



Zesty H<sub>2</sub>-DRI fines have been successfully briquetted into a green HBI product



Focused de-risking campaign enabled key technical risks to be better defined, with technical solutions incorporated into demonstration plant design



## Zesty has tested various iron ores from industry partners at Pilot Scale;

- Rio Tinto
- BHP
- Fortescue
- Grange Resources
- Hancock Iron Ore
- OneSteel Manufacturing

Side profile of HBI produced from ZESTY H<sub>2</sub>-DRI briquetted at 200 MPa, 800 °C (scale: each square is 0.5x0.5 cm)



# Strong Customer Value Proposition

The Zesty FEED study and pilot testing returned highly encouraging results, with good potential for low-cost green iron

## Demo plant Pre-FEED / FEED study completed



**130+**

Tests completed in Pilot plant



**9**

Australian ores variants tested<sup>1</sup>



**70-98%**

Metallisation degree



**0.9-1.3 MWh**

per tonne of HBI<sup>2</sup> – highly efficient



**US\$ 390-500**

per tonne of HBI production cost<sup>3</sup>



**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 production<sup>1</sup>
- ✓ Zesty could reduce the emissions intensity of reducing iron ore to metal iron from 1.89 tonnes of CO<sub>2</sub> / tonne of iron to near zero
- ✓ No pelletisation or sintering = considerable capital and operating expenditure savings
- ✓ Low consumption of green hydrogen = approaching theoretical minimum for reduction
- ✓ Efficient and flexible electrical indirect heating methodology
- ✓ Economics expected to improve further with scale
- ✓ Including the cost of carbon would further enhance economics

1. Only some data points approved for public disclosure 2. excluding energy required for hydrogen, i.e. conversion energy requirement only 3. See press release Calix Limited of 12 Feb 2024: cost of AUD 630-800 per tonne of HBI and assumed electricity cost USD 23-30 /MWh, and green LCOH of USD 3.4-3.9 /kg; all @FX 1.60 AUD/USD

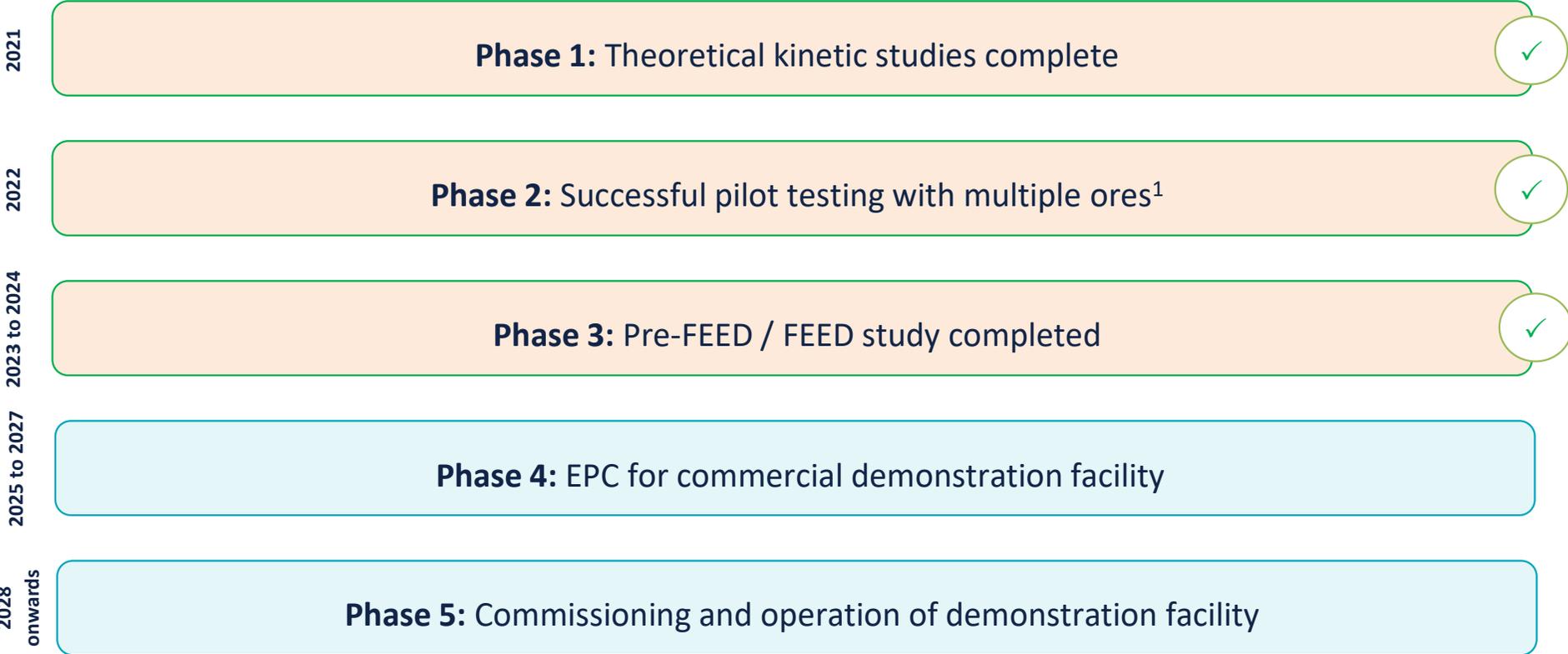
# De-Risking Zesty

Key risks are being addressed in the scale-up phase supported by in-house R&D, industry and research partnerships

Technical Risk	De-Risking Strategy
<b>Heat Transfer</b> – Scaling up may reduce heat transfer efficiency, impacting process temperatures	Reactor scaled using modelling & experience; modular approach for further scaling; heat flux & temperature distribution monitoring
<b>Ultrafine Particle Recycle</b> – Loss of ultra-fines in up-flowing gases may reduce material recovery	Optimised reactor design, fines recovery system, and milling circuit adjustments to minimise losses
<b>Agglomeration &amp; Build-up</b> – Ultra-fines can accumulate, cause blockages, and lead to downtime	Process design minimises sticking; anti-sticking additives (MgO, CaO, Al <sub>2</sub> O <sub>3</sub> ) under evaluation
<b>H<sub>2</sub> Recycle</b> – Hydrogen losses increase operating costs; loop not tested at pilot scale	Simplified H <sub>2</sub> recycling due to indirect heating; pre-heating to improve tolerance to H <sub>2</sub> O in recycled H <sub>2</sub>
<b>Magnetite Processing</b> – Lower porosity limits reduction, reducing efficiency	Pre-oxidation to hematite improves reducibility; increased reactor length at demo scale to improve metallisation
<b>HBI-A Grade Product</b> – DRI needs higher density & Fe content to meet shipping standards	Optimising briquetting conditions & feedstock; higher-grade ores & revised HBI specifications under assessment

# Zesty technical development progress

The Zesty technology is proven at pilot scale. Calix has finalized its FEED study and is targeting to develop a commercial demonstration facility by 2028



1. Ongoing ore testing

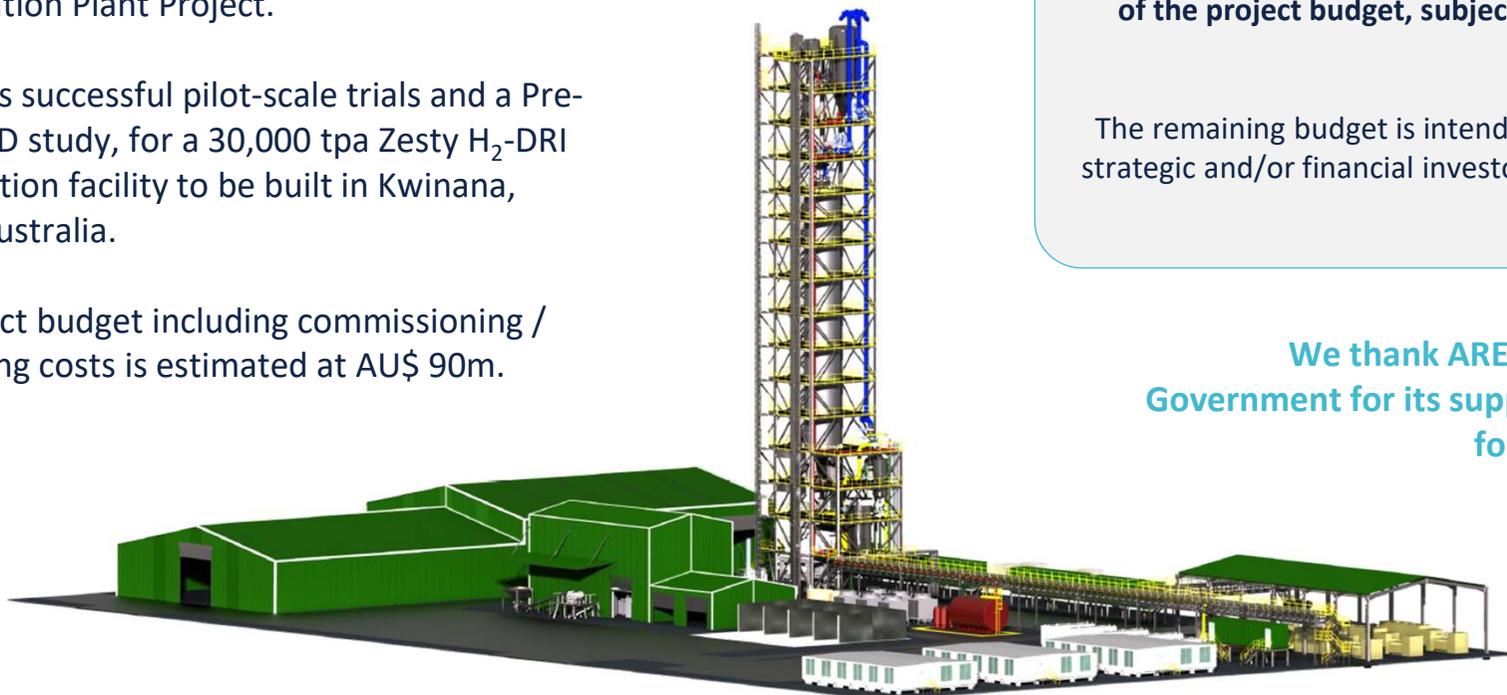
# Australian Renewable Energy Agency funding for Zesty

Green Iron Demonstration Project up to 50% funded by ARENA

Following a thorough technical and commercial due diligence process, Calix has executed a grant agreement with ARENA of AU\$ 44.9m for a Zesty Demonstration Plant Project.

This follows successful pilot-scale trials and a Pre-FEED / FEED study, for a 30,000 tpa Zesty H<sub>2</sub>-DRI demonstration facility to be built in Kwinana, Western Australia.

Total project budget including commissioning / initial testing costs is estimated at AU\$ 90m.



## PROJECT FUNDING

The ARENA grant provides up to 50% of the project budget, subject to project milestones being achieved<sup>1</sup>.

The remaining budget is intended to be financed from strategic and/or financial investors **directly** into a Zesty subsidiary business.

We thank ARENA and the Australian Government for its support of a shared vision for a green iron industry in Australia.

1. See Calix ASX Announcement 24t6h July 2025, [https://calix.global/wp-content/uploads/2025/07/2025-07-24-ARENA-funding-for-ZESTY-Demo-Plant\\_ASX-Announcement-FINAL.pdf](https://calix.global/wp-content/uploads/2025/07/2025-07-24-ARENA-funding-for-ZESTY-Demo-Plant_ASX-Announcement-FINAL.pdf)

# Joint Development Agreement with Rio Tinto

## Cash and in-kind financial support for the Zesty Green Iron Demonstration Plant

- A contribution of over AU\$35m of value for the demonstration and commercialisation of Zesty
- Cash payments will be provided in two tranches of AU\$3m and AU\$5m prior to a Final Investment Decision (FID), subject to the completion of project milestones
- Further in-kind contributions are designed to:
  - Enable a positive FID through the provision of the Project site, technical support, engineering services, and advocacy
  - Provide 10,000 tonnes of iron ore for plant commissioning and operations (subject to a positive FID and construction of the plant)
  - Provide introductions to potential users of the Zesty green iron product for material testing and downstream processing to steel



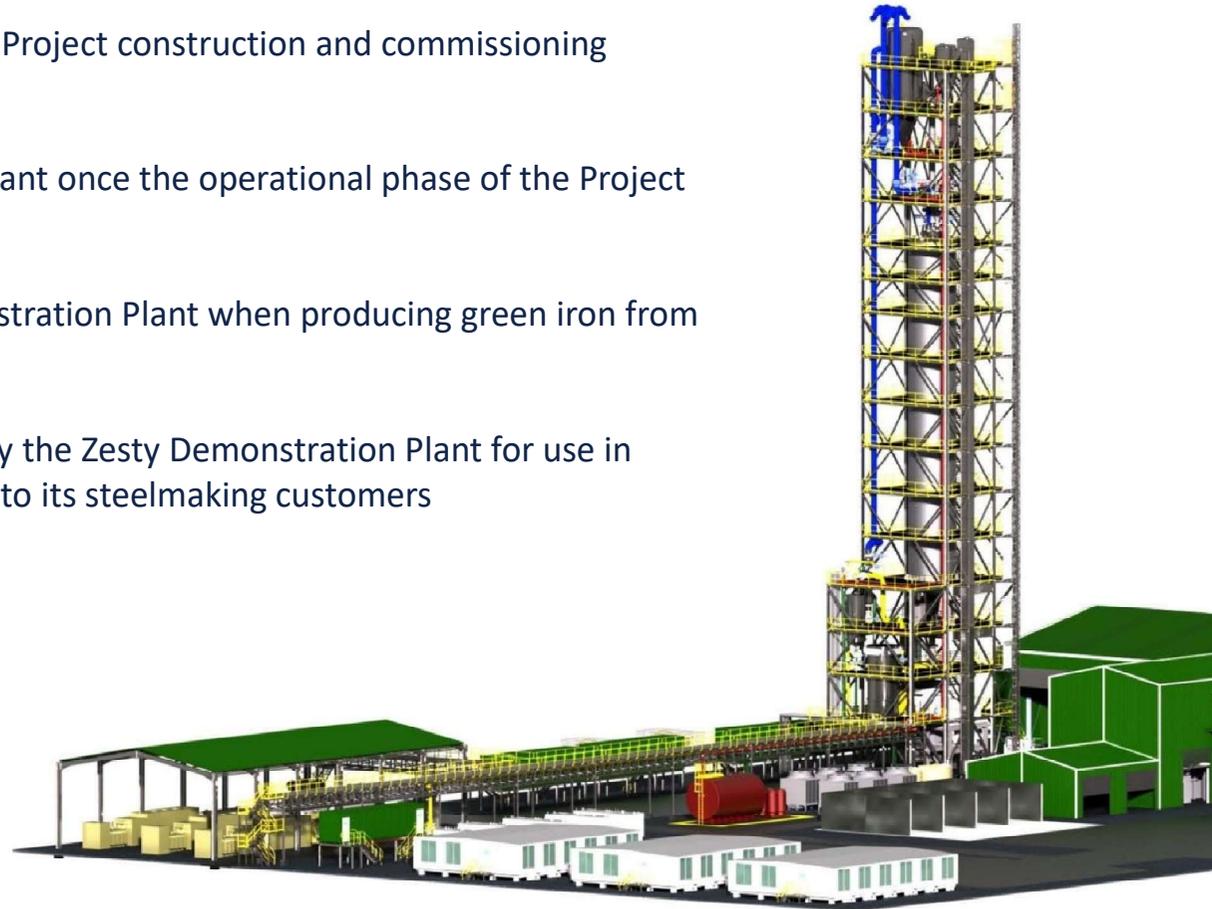
\*Refer to Calix's ASX Announcement dated 17 November 2025 for further details

# Support for operations

## Non-exclusive tolling of iron ores

Subject to a positive FID and the successful completion of the Project construction and commissioning milestones, Rio Tinto will:

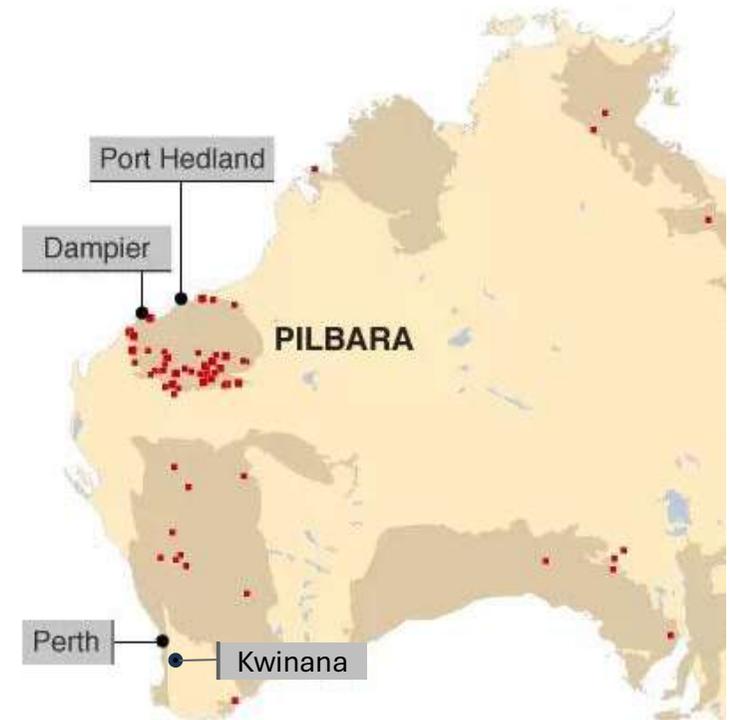
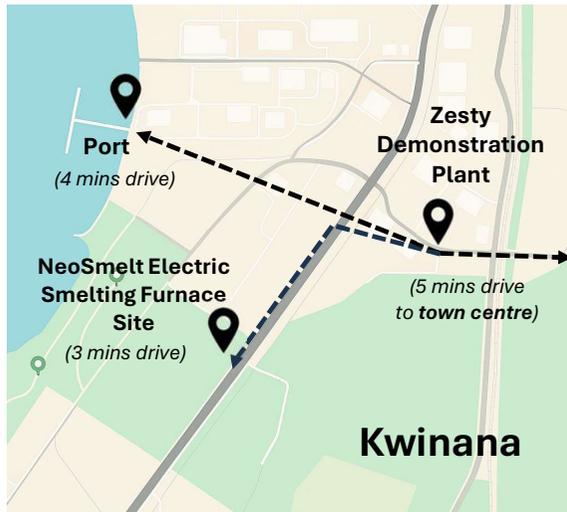
- have non-exclusive use of the Zesty Demonstration Plant once the operational phase of the Project commences
- contribute to the operating costs of the Zesty Demonstration Plant when producing green iron from their Pilbara iron ores via a tolling model
- help facilitate the off-take of H<sub>2</sub>-DRI / HBI produced by the Zesty Demonstration Plant for use in downstream steelmaking, including via introductions to its steelmaking customers



\*Refer to Calix's ASX Announcement dated 17 November 2025 for further details

# Zesty's strategic location

- The Zesty Demonstration Plant will be located in Kwinana, Western Australia (38km south of Perth)
- The Kwinana site is in close proximity to the proposed NeoSmelt facility for potential downstream processing of Zesty H-DRI
- It provides access to established utilities, ports and other infrastructure, and is in relative proximity to other major sources of iron ore in Australia



■ Areas with high concentration of iron ore  
■ Mineral deposits with +100m tonnes of iron ore

\*Refer to Calix's ASX Announcement dated 17 November 2025 for further details

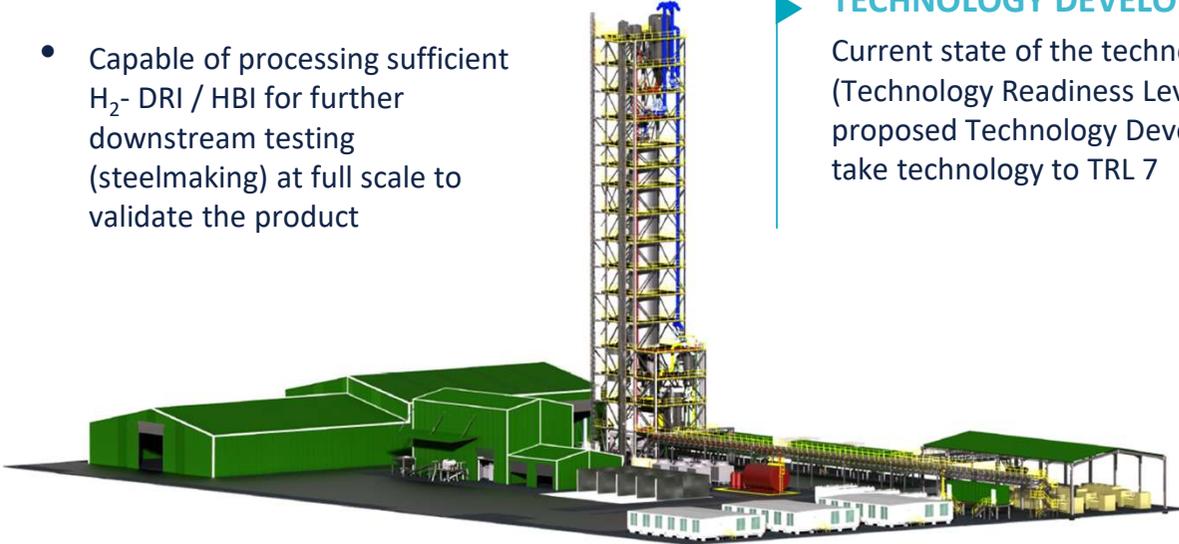
Source: Australian Government, Geoscience department 2018

# Next steps: Design engineering, technology development & commercial studies

Calix's 2024 Front End Engineering Design study for a Zesty Demonstration plant assumed 30,000 tpa with a Capex +/- 25%, including contingency

## 30,000 tpa is the correct step for the demonstration plant

- Represents full-scale implementation of a single reactor tube – the basis for further scale-up
- Capable of processing sufficient H<sub>2</sub>- DRI / HBI for further downstream testing (steelmaking) at full scale to validate the product



Render of 30ktpa Zesty demonstration plant

## DETAILED DESIGN ENGINEERING

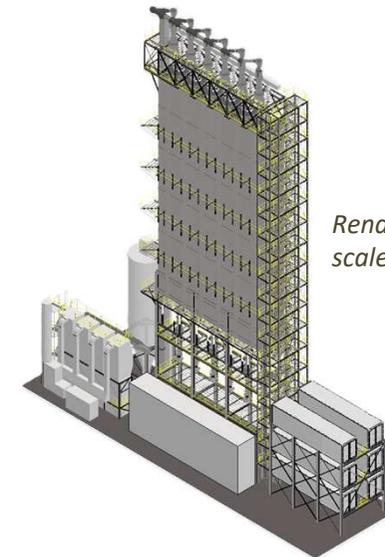
Site-specific detailed design engineering for the Zesty Demonstration Plant in Kwinana, Western Australia

## TECHNOLOGY DEVELOPMENT

Current state of the technology is TRL 5 (Technology Readiness Level) and the proposed Technology Development Plan will take technology to TRL 7

## COMMERCIAL READINESS

The completion of a commercial study program, including the design and performance information will aim to enable scale-up of the demonstration plant via a modular system to full-scale commercialization



Render of modular full-scale Zesty plant

# Zesty Demonstration Project Overview

Location	Partners	Funding support	Current status	Next milestone
Kwinana, Western Australia	Rio Tinto, HILT CRC	Australian Renewable Energy Agency	Detailed Design Engineering	FID (targeted 2026)

## Project objectives

1. Construct, commission and operate a 30,000 tonne per annum hydrogen direct reduced iron (H<sub>2</sub>-DRI) and hot briquetted iron (HBI) Zesty Demonstration Plant
2. Deliver a Pre-FEED / FEED study for a commercial scale Zesty plant

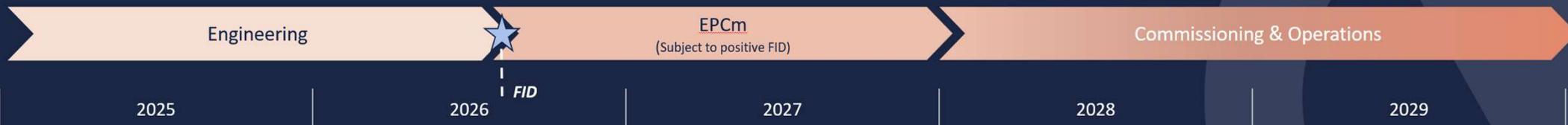
## Non-exclusive iron ore tolling

- The project will produce H<sub>2</sub>-DRI from a wide range of Australian and international iron ores with different mineralogy, grade and compositions
- Iron ore supply for demo project plus first toll processing and off-take agreement secured with Rio Tinto
- The project will:
  - assist in progressing the viability of Australian iron ore in a low emissions steel value chain
  - support the development of a green iron industry in Australia
  - support global deployment of the technology

## Flexible steelmaking pathways

- The project will facilitate testing of the H<sub>2</sub>-DRI / HBI product by multiple steelmakers using different steelmaking routes. These include:
  - Substituting a portion of the iron ore charge to a blast furnace
  - Electric smelting prior to use in a Basic Oxygen Furnace or Electric Arc Furnace
  - Direct feed to an Electric Arc Furnace

## Indicative timeline (calendar year)



*\*Project timelines are indicative only. Please refer to ASX announcements for latest project timelines*

# Acknowledgements



ZESTY recognition on the global stage



COP29 global Net-Zero Industry Award for Outstanding Project 2024



HILTCRC Award for Best Contribution to Industry-Research Collaboration 2024



Next Gen : Decarbonising Industrial Heat & Electrification category 2025





# THANK YOU



**Matt Boot-Handford**  
Chief Scientist – Calix Ventures  
[mboot-handford@calix.global](mailto:mboot-handford@calix.global)



**Chris Ormston**  
General Manager Sustainable Processing  
[cormston@calix.global](mailto:cormston@calix.global)



**Sebastiaan van Dorp**  
Business Development Manager  
[svandorp@calix.global](mailto:svandorp@calix.global)

**Media enquiries**  
[media@calix.global](mailto:media@calix.global)

**Investor relations**  
[Investorrelations@calix.global](mailto:Investorrelations@calix.global)



Follow us on Twitter [@Calixlimited](https://twitter.com/Calixlimited)

[www.calix.global](http://www.calix.global)



**[Subscribe to our Newsletter](#)**