

18 April 2023

## Calix Investor Presentation – April 2023

**Sydney, Australia | 18 April 2023** – Australian environmental technology company, Calix Limited (ASX: CXL) (“Calix” or “the Company”) is pleased to provide a copy of its presentation to the Canaccord CG Sustainability Series, a virtual conference addressing the themes of climate change, sustainability and pollution control and the companies at the forefront of this activity domestically.

The following presentation was delivered by Managing Director and CEO, Phil Hodgson at 8:30am on Tuesday 18 March 2023.

-ENDS-

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

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## About Calix

Calix is a team of dedicated people who are urgently developing great businesses, leveraging our patented technology, that deliver positive global impact.

The core technology is being used to develop more environmentally-friendly solutions for water treatment, CO<sub>2</sub> mitigation, biotechnology, advanced batteries, and more sustainable mineral and chemical processing.

Calix develops its technology via a global network of research and development collaborations, including governments, research institutes and universities, some of world's largest companies, and a growing customer base and distributor network for its commercialised products and processes.

Because there's only one Earth – Mars is for Quitters.

**Website:** <https://www.calix.global/>

**Twitter:** @CalixLimited

**YouTube:** [CalixLimited](#)

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# Decarbonisation technology for multiple industries

Canaccord Sustainability Series  
April 2023

# Important Disclaimer



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

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This presentation contains summary information about the Company and its subsidiaries ("Calix") and their activities current as at 18<sup>th</sup> April, 2023. 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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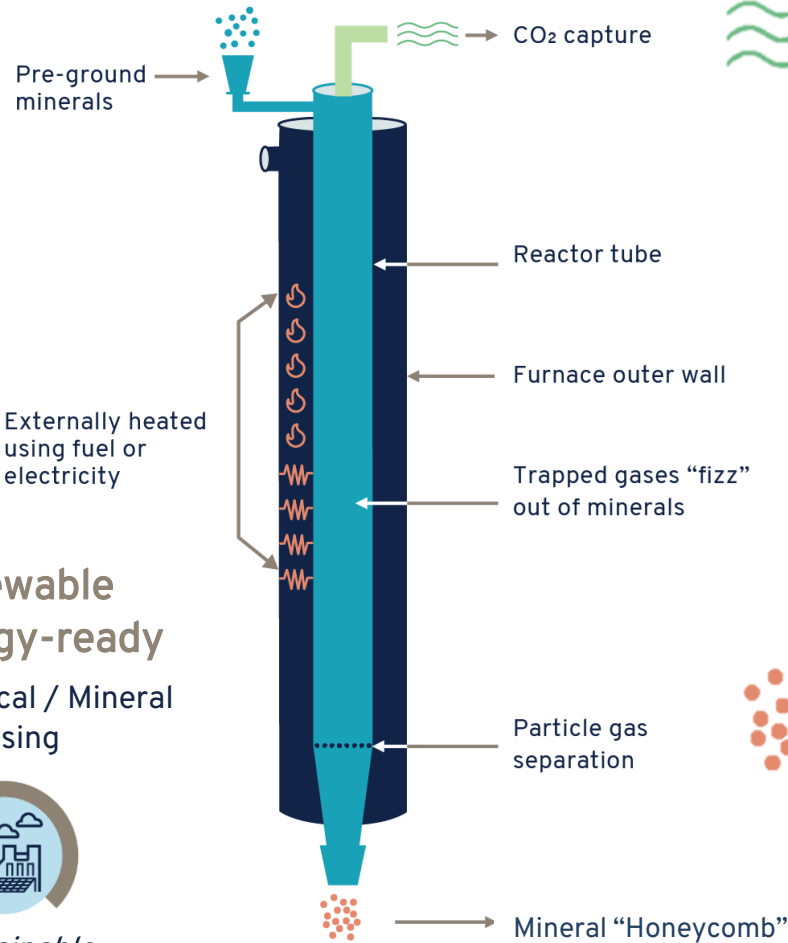
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# Calix's core technology platform


A new way to heat stuff up...



 **CO<sub>2</sub> capture**  
Capture of high purity CO<sub>2</sub> when processing limestone



 **Highly-active materials**  
Highly porous "honeycomb" structure = more chemical- and/or bio-activity

 **Renewable energy-ready**  
Chemical / Mineral processing



*Sustainable Processing*



*Biotech*



*Battery Materials*



*Water*

**An AUSTRALIAN invention...**



28 patent families covering core technology and applications



>A\$120m has been invested to date in developing the technology



# Industrial decarbonisation tailwinds

Calix's mission is being propelled by net zero commitments

## Government policy

**~90%**

of global GDP now under net zero commitments.<sup>1</sup>

## Investor activity

**US\$42tn**

assets of signatories to the '2022 Global Investor Statement to Governments on the Climate Crisis'.<sup>2</sup>

## Net zero spending

**US\$275tn**

Estimated spend required by 2050 to fund the global energy transition.<sup>3</sup>

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1. <https://zerotracker.net/>
2. 2022 Global Investor Statement to Governments on the Climate Crisis. The Investor Agenda
3. The net-zero transition: What it would cost, what it could bring. McKinsey Sustainability.



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# Policies driving decarbonisation



Carbon penalties, value & support in Europe, US, and now Australia...

## EUROPE

### Emissions Trading Scheme

- €80 – 2022 average EU ETS price, up from €50 in 2021
- 2.2% year-on-year reduction in free CO<sub>2</sub> permits to 2030

### Carbon Border Adjustment Mechanism

- A new carbon tariff, commencing in 2023
- Paves the way for phase out of exemptions for heavy industry

### Innovation Fund

- Energy, CCU/S, Energy Storage
- €10b funding from 2020 to 2030
- Up to 60% contribution for innovative projects

## US

### Inflation Reduction Act

- US\$85 / tonne of CO<sub>2</sub> permanently stored
- US\$180 / tonne for DAC + permanent CO<sub>2</sub> storage
- US\$130 / tonne for DAC + used CO<sub>2</sub>
- Open to projects commencing construction before 2033
  - > 12ktpa industry
  - > 1ktpa DAC

### DAC hubs

- US\$3.5 billion to establish Regional Direct Air Capture hubs
- Develop networks to facilitate sequestration or carbon utilization.

## AUSTRALIA

### Safeguard Mechanism

- A price on carbon, capped at AU\$75

### National Reconstruction Fund

- \$15b fund with up to \$3b for renewables and low-emission technologies & \$1b for value-adding in resources.

### Powering the regions fund

- AU\$600m for decarbonisation of trade-exposed businesses
- **Carbon Capture Technologies Program**
- AU\$141m for hard-to-abate industries, such as cement

### Critical Minerals Strategy

- Value-add, downstream processing & decarbonisation

### Carbon Border Adjustment Mechanism?

- Introduction of an Australian CBAM under review...

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### Largest single source of industrial emissions

- ~8% of global emissions<sup>1</sup>
- Unavoidable process emissions released directly from limestone.

### Net zero commitments

- GCCA member companies covering 40% of global cement production (80% outside of China) – have set a net zero by 2050 target.<sup>2</sup>
- 1.4 billion tonnes of CO<sub>2</sub> from cement needs to be captured and stored annually by 2050 to reach net zero.<sup>2</sup>

*“Carbon Capture and Storage (CCS) plays a major role in decarbonizing the industry sector in the context of 1.5°C and 2°C pathways, especially in industries with higher process emissions, such as cement.” – IPCC<sup>3</sup>*

## Market drivers



**Carbon pricing:** 36 carbon taxes & 32 Emissions Trading Systems, covering 23% of global emissions & generating \$84bn in revenue<sup>4</sup>



**>€80/tonne** average EU carbon price for 2022



**US\$85/tonne** US tax credit for stored CO<sub>2</sub>

### SDG Impact

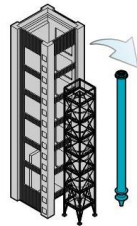


1. Trends in global CO<sub>2</sub> emissions; 2016 Report, The Hague: PBL Netherlands Environmental Assessment Agency  
 2. Global Cement & Concrete Association. Concrete Future Roadmap.

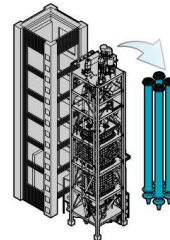
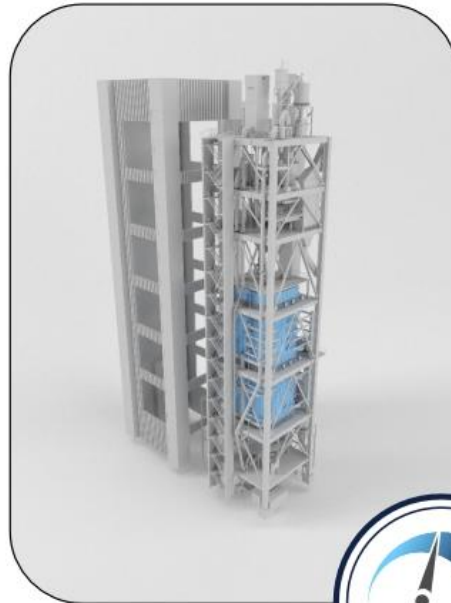
3. SR1.5 Chapter 2. IPCC. 2018  
 4. <https://zerotracker.net/>, <https://carbonpricing>



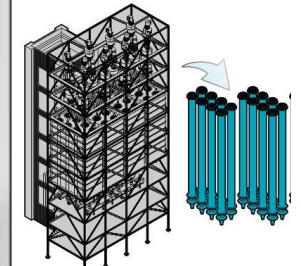
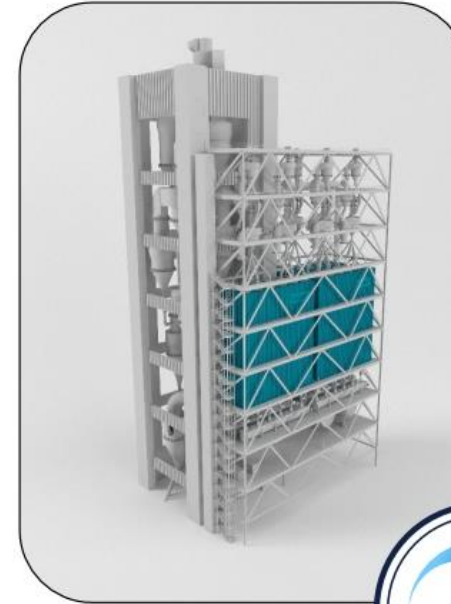
**Leilac-1**, Lixhe, Belgium  
 25,000 tonnes / year CO<sub>2</sub>  
 1 tube  
 Built: operational 2019



**Leilac-2**, Hannover  
 100,000 tonnes / year CO<sub>2</sub>  
 4 tubes – 1 module  
 Passed FID



**Leilac-3**  
 0.5 million+ tonnes / year CO<sub>2</sub>  
 Several multi-tube modules  
 Multiple in planning



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# Leilac's full scale vision

BUT...we need to mitigate  
1.4 billion tonnes per annum  
of process CO<sub>2</sub> emissions

= up to 3,000 Leilac-3s

~2 built every week from  
now until 2050 !!



Leilac

	Project discussions	Initial scoping	Detailed scoping / MOU	Pre-FEED / BOD	FEED	FID + construction	Operational	Total
Aug 2021	21	7	4	1			1	34
Aug 2022	25	13	9	5		1	1	54
Feb 2023	34	19	8	 6	 2	 1 <i>Leilac-2</i>	 1 <i>Leilac-1</i>	71

- Pipeline growth: as at February 2023 there were **71 projects** in the pipeline
  - Projects are ~ 2/3 cement and 1/3 lime, at average capacity of 500kTpa CO<sub>2</sub> for cement and 80 kTpa CO<sub>2</sub> for lime.
  - Leilac pipeline represents potential for over **20 Mtpa of CO<sub>2</sub> abatement projects**.
- Heidelberg Materials global perpetual license executed 1H FY23
- TARMAC project moves into FEED phase: 30kTpa lime facility with partial H<sub>2</sub> firing and CO<sub>2</sub> capture as part of HYNET project, UK.
- Three new projects with CEMEX announced in Germany, Poland and the US.
- Adbri – work continues on pre-FEED for a 20kTpa electric facility with CO<sub>2</sub> capture – **with up to 15kTpa CO<sub>2</sub> now targeted for supply to the HyGATE Project<sup>1</sup>, to produce green methanol a precursor for sustainable aviation and marine fuels**
- **Windship** – Leilac awarded £1m as part of the £ 5m award to the Windship consortium to decarbonise shipping using zero emissions lime

1. <https://arena.gov.au/funding/german-australian-hydrogen-innovation-and-technology-incubator-hygate/>



**Leilac**

# Decarbonising shipping & aviation

Leilac's core technology applied into new markets

## Carbon capture for shipping

- Combining renewably powered propulsion & lime-based carbon capture to develop a low-cost decarbonisation solution for shipping, in partnership with Windship Technologies Ltd.
- The project is supported by £5m (AU\$8.73m) funding from the UK Government<sup>1</sup>.
- It aims to demonstrate the potential for zero emissions lime to reduce and eliminate emissions from diesel powered vessels.
- Calcium looping for carbon capture with low emissions lime is an exciting application with significant potential into several markets.

## Sustainable fuels from captured CO<sub>2</sub>

- The Solar Methanol Project is developing a world-first methanol production plant using renewable energy, green hydrogen and captured industrial CO<sub>2</sub>.
- Awarded ~\$40m funding as part of the German-Australian HyGATE initiative.
- The project intends to use CO<sub>2</sub> captured by the Leilac technology during the production of low emissions lime, in partnership with Adbri (ASX: ABC).

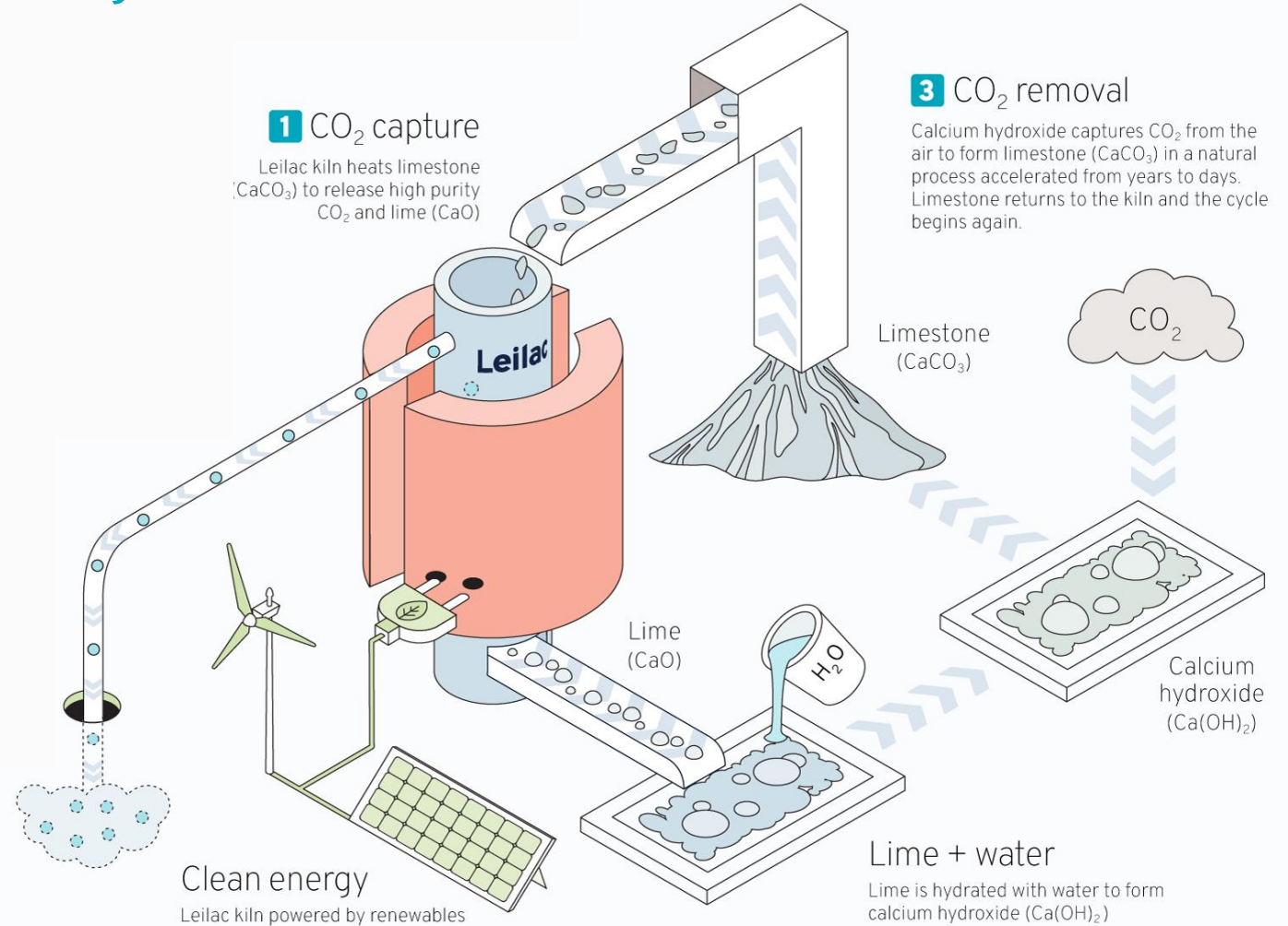
1. [Leilac and Windship awarded £5m funding to demonstrate zero emissions shipping technology](#)  
2. [Calix part of Australian-German consortium awarded funding to manufacture sustainable fuels from captured CO2](#)  
3. <https://www.iea.org/reports/transport>



Shipping & aviation are two of the hardest-to-abate transport sectors, responsible for 4.3% of global CO<sub>2</sub> emissions<sup>3</sup>.

### Non-binding MOU for DAC global licence agreement with Heirloom

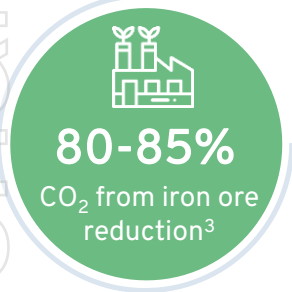
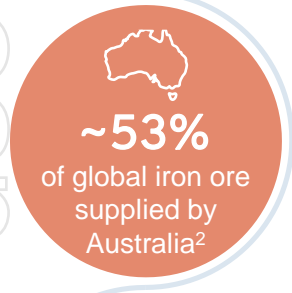
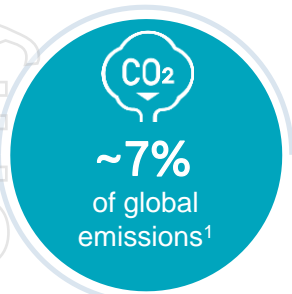
- Heirloom<sup>1</sup> is a Direct Air Capture company with an objective of capturing 1 billion tonnes of CO<sub>2</sub> by 2035.
- Heirloom's backers include Gates-led Breakthrough Energy Ventures, Carbon Direct and Microsoft.
- The MOU outlines key collaboration terms, including US\$3m in R&D contribution from Heirloom to advance Leilac calcium looping.
- The MOU also covers key terms for a global licence agreement, which once executed, will apply to any Heirloom facility.
- The technology licence fee comprises:
  - i. A royalty floor of US\$3 per tonne of CO<sub>2</sub> captured; and
  - ii. A variable royalty rate based on the prevailing CO<sub>2</sub> price for lime decarbonisation, less the amortised cost of capital of the Leilac kiln per tonne of CO<sub>2</sub> separated.



1. <https://www.heirloomcarbon.com/>

# Decarbonising iron and steel

Indispensable, carbon-intensive & hard-to-abate.



## Australian iron

- >A\$150b...44% of Australian export earnings in 2021<sup>4</sup>
- 96% of Australian iron ore is haematite<sup>5</sup>
- Value creation opportunity
  - 3-4x value add: iron ore → iron
  - Green Iron...

## Decarbonisation solutions...ideally

- Resource efficient
  - Compatible with multiple ore types
  - Low waste
- Minimal supply chain disruption
- Fast route to impact
- Economical
  - Leverage existing assets
  - Efficient use of energy, reductant & raw material

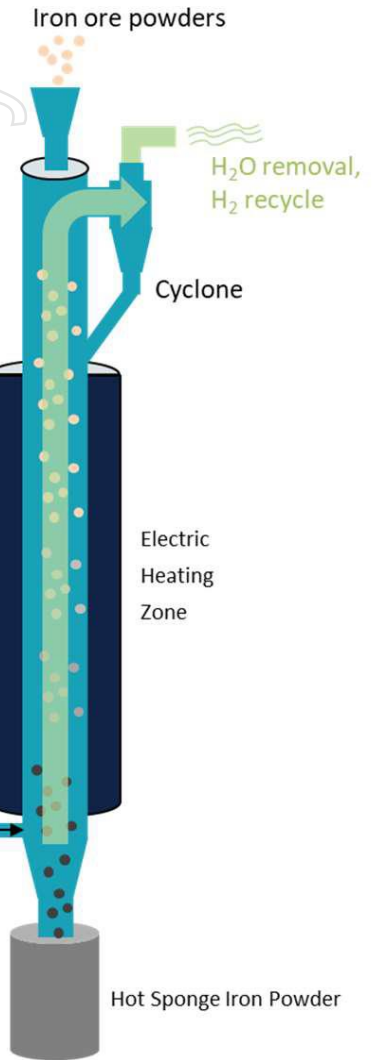
1. Climate change and the production of iron and steel. World Steel Association. 2021  
2. [www.statista.com](http://www.statista.com)  
3. Climate change and the production of iron and steel. World Steel Association. 2021

4. <https://www.minerals.org.au/news/record-high-resources-export-revenue>  
Global Cement & Concrete Association. Concrete Future Roadmap.  
5. Iron Ore | Geoscience Australia  
6. <https://zerotracker.net/>

# Zero Emissions Steel Technology



Potential lowest cost zero emissions iron & steel



## About ZESTY

- Hydrogen reduction of iron ore
- Can be easily and efficiently renewably powered
- Targeting theoretical minimum hydrogen use – simple gas recycle
- Processes fines <~0.3mm, no pelletisation
- Targeting zero emissions iron and steel\*

	Simple process (low pressure / no fluid beds)	Compatible with fines & lower grade ores	No fossil fuel requirement	No CCS required	H <sub>2</sub> not combusted / easily recycled
BF / BOF + H <sub>2</sub>	✓	✗	✗	✗	✗
DRI-MIDREX	✓	✗	✗	✗	✗
DRI-HISARNA	✓	✓	✗	✗	✗
FINMET	✗	✓	✗	✗	✗
HYBRIT	✓	✗	✓	✓	✗
DRI_MIDREX H <sub>2</sub>	✓	✗	✗	✗	✗
Flash iron making	✓	✓	✓	✓	✗
HYFOR	✗	✓	✓	✓	✗
<b>ZESTY</b>	✓	✓	✓	✓	✓

\*in conjunction with Calix's "Leilac" zero emissions lime

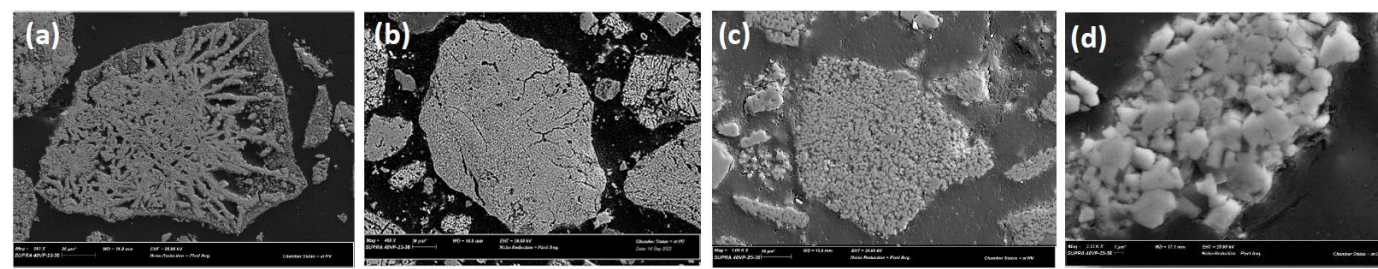
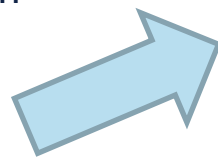
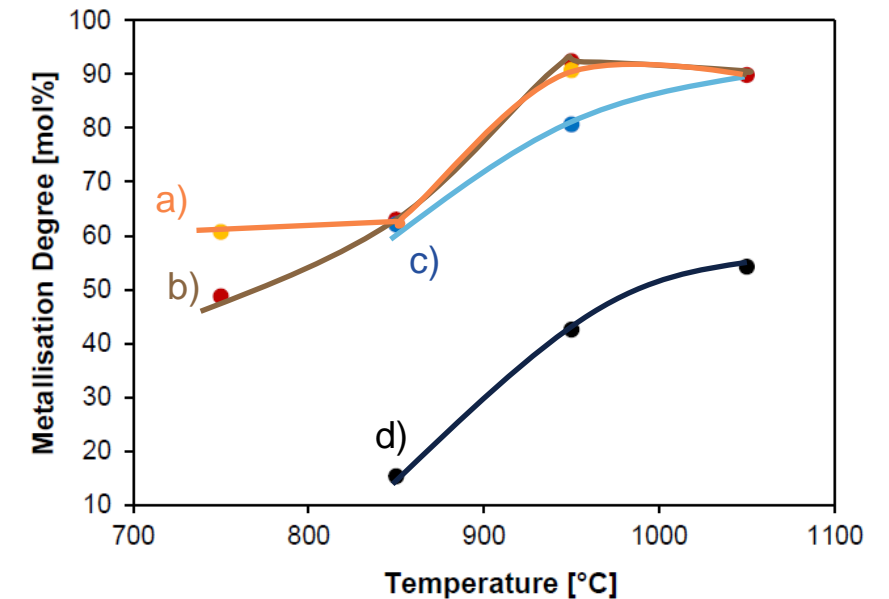
# Zero Emissions Steel Technology

ZESTY development to date...

## Phase 1 & 2: completed

- ✓ Theoretical kinetic studies
- ✓ Conversion of electric calciner to run hydrogen
- ✓ Confirmation of electric calciner + hydrogen reduction performance
- ✓ Successful pilot testing with multiple ores

		Fe Wt (%)	D50 (um)	SSA (m <sup>2</sup> /g)	Pore Volume (cm <sup>3</sup> /g)
a)	Siderite	43	87	25	0.035
b)	Goethite / Hematite	57	130	15	0.034
c)	Goethite / Hematite	59	129	14	0.039
d)	Magnetite	67.5	38	0.8	0.003



SEM Images of the different samples after processing @950C; H<sub>2</sub>/O<sub>red</sub> =2



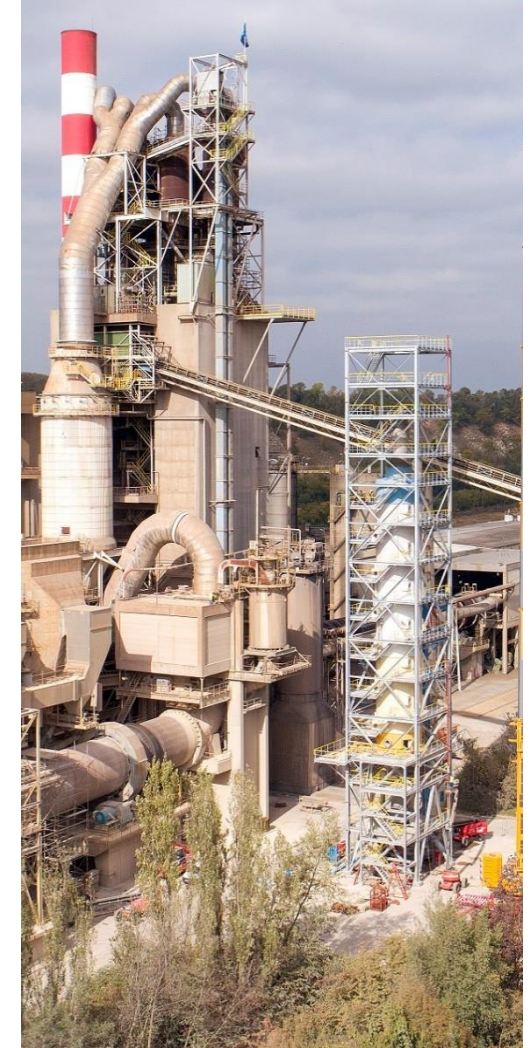
# Calix's ZESTY Technology: pre-FEED / FEED study



Towards Financial Investment Decision by end-2023

## Pre-FEED / FEED study

- A\$947,035 ARENA grant.
- Proposed 30,000 tpa, zero CO<sub>2</sub> emissions ZESTY-iron demonstration plant.
- Study towards final investment decision, including:
  - Testing / confirmation / design input from pilot test runs
  - Beneficiation / passivation / briquetting / smelting trials
  - Multiple ore testing
  - Site determination
  - Knowledge sharing & partnership development



*The ZESTY reactor will be the same scale as Leilac-1 reactor for cement and lime*

*A render of the Calix fully electric ZESTY reactor rated for 30kTpa iron production*

**HILTCRC**

Heavy Industry  
Low-carbon Transition



Australian Government  
Australian Renewable  
Energy Agency

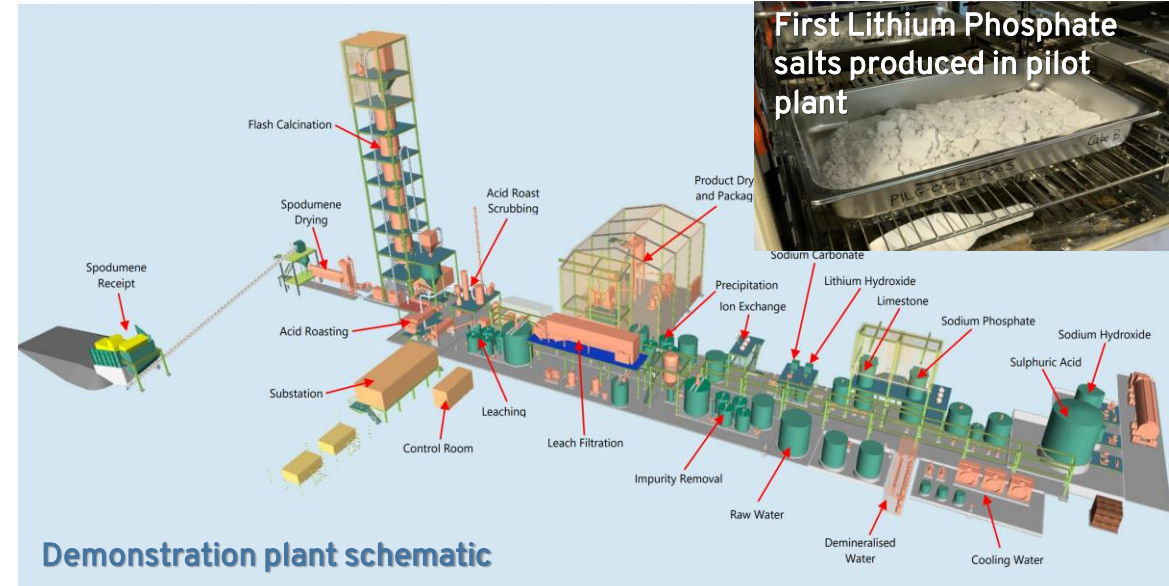
**ARENA**  
10 YEARS

# Development of lithium salt project with Pilbara Minerals

## TARGETING JV FORMATION AND COMPLETION OF FEED IN FY23



- PILBARA MINERALS (ASX:PLS): JV Full Documentation Executed with \$20m in Federal Government funding announced under the Modern Manufacturing Initiative<sup>1</sup>
- Project CAPEX budget estimate from scoping study is \$50-70m
- CXL will own 45% of the JV and contribute 35% of the capital (10% free carry negotiated as per Calix IP contribution)
- Majority of world's lithium forecast to be sourced from hard rock lithium – projected to grow 5x in this decade<sup>2</sup>
- Global market Lithium Carbonate and equivalents: 0.54 MTpa in 2021; 3.3 MTpa by 2030<sup>3</sup>
- The demonstration plant will have 2 distinct advantages:
  - Low-carbon: solar-powered electrification of calcination
  - Recovery: Calix technology gives higher recovery from ore body
- **At current lithium prices, the demonstration scale plant running at full capacity could generate ~US\$85m revenue for the JV<sup>4</sup> on an annual basis**



### Next Steps

- JV established (covering Demo plant, joint marketing of technology)
- FID targeted H1 2023
- Market development – lithium phosphate salt
- Construction targeted from Q2/Q3 2023 to 2024
- Commissioning and testing late 2024, on way to achieving full production and sales, subject to market developing for lithium phosphate salt product
- Li-salt production technology to then be licensed by the JV to Pilbara Minerals and the global spodumene industry

1. Grant funding announced, awaiting contract finalisation following change in Federal Government in May 2022

2. Benchmark Minerals Intelligence, Oct 2020

3. McKinsey Apr 2022

4. Calix share is projected to be 45% of the JV. JV total revenue Assumes prevailing lithium prices Li-Carbonate-equivalent of US28.9k/tonne (43k A\$/tonne) and targeted lithium phosphate production of ~3,000tpa (source: Argus metals 17 April 2023)

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