

**28 November 2023**

## **Calix Investor Presentation – November 2023**

**Sydney, Australia | 28 November 2023** – Australian environmental technology company, Calix Limited (ASX: CXL) (“Calix” or “the Company”) is pleased to provide a copy of its latest investor presentation.

**-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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# Calix Limited Investor Briefing Paper

November 2023

CALIX.COM.AU

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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 28<sup>th</sup> November 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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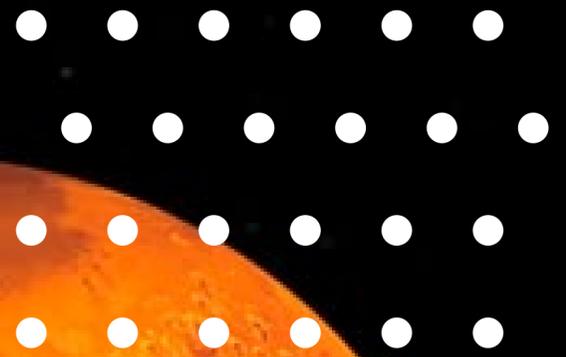
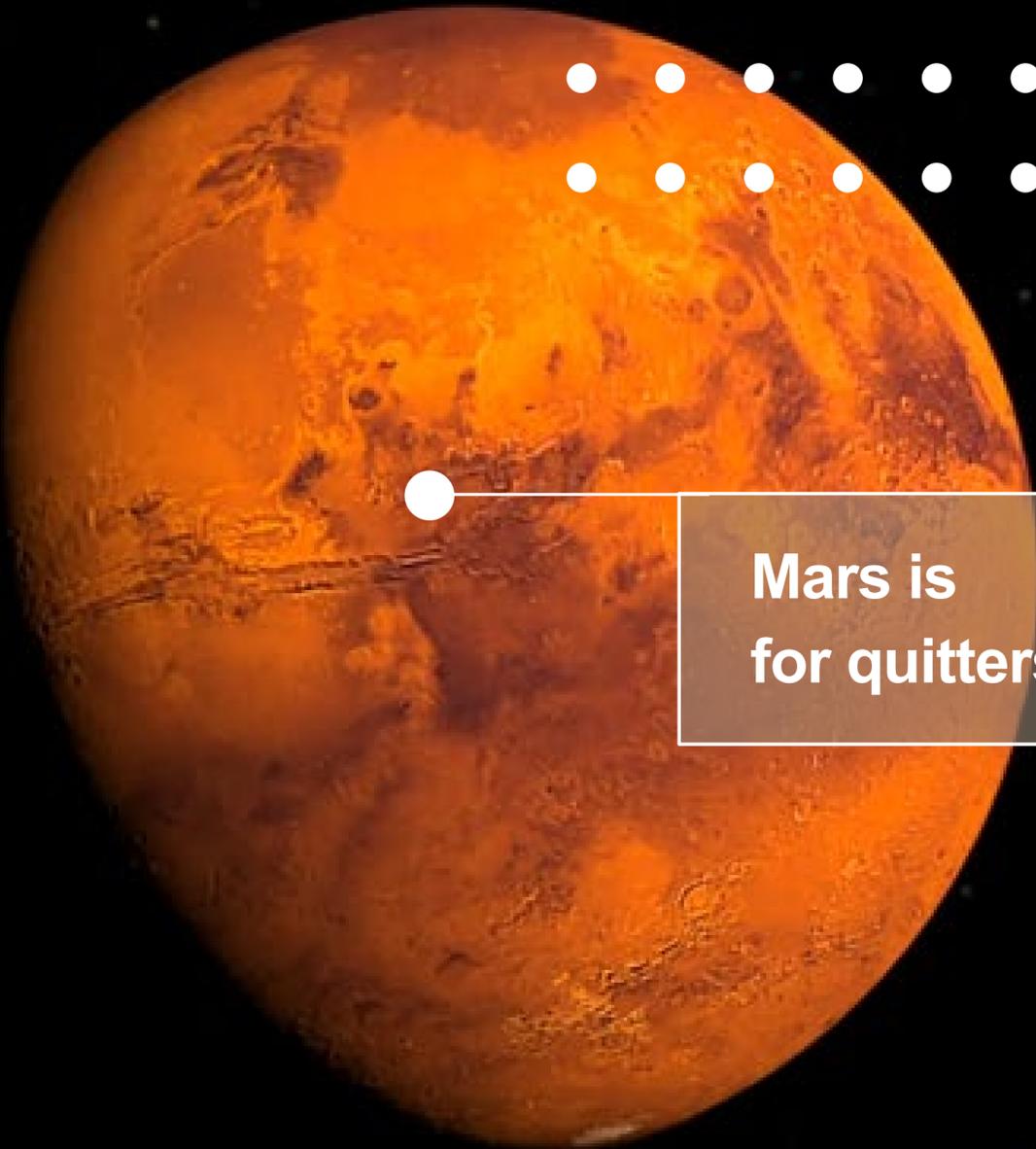
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**“It is now cheaper  
to save the world  
than destroy it.”**

**Akshat Rathi.**  
**Climate Capitalism: Winning the  
Global Race to Zero Emissions.**



**Mars is  
for quitters**



# Policies driving decarbonisation – Latest News

Carbon penalties, value & support in Europe, US, & now Australia are accelerating the need for industrial decarbonisation...

## Europe

### Emissions Trading Scheme (EU ETS)

- EU ETS CO<sub>2</sub> price averaging €90 in 2023
- 2.2% year-on-year reduction in free CO<sub>2</sub> permits to 2030
- [Jan 2024: EU ETS will extend into all shipping > 5000T](#)

### Carbon Border Adjustment Mechanism (CBAM)

- [The CBAM commenced its initial reporting phase in October 2023](#)
- CBAM paves the way for phase out of exemptions for heavy industry in the EU

### Innovation Fund

- €10b funding from 2020 to 2030
- Up to 60% project cost contribution

### Net-Zero Industry Act

- CCS identified as a strategic priority
- 50 million tonnes of annual CO<sub>2</sub> storage capacity to be developed by 2030

## 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>

### US-Australia Climate, Critical Minerals & Clean Energy Transformation Compact

- Fast-track critical mineral supply chains
- Access to US capital and IRA benefits for Australian companies as a 'domestic source'

### Direct Air Capture (DAC) hubs

- US\$3.5 billion to establish Regional Direct Air Capture hubs
- [Aug 2023: Project Cypress in Louisiana one of first two projects selected for up to US\\$600 million in funding.](#)
- [Calix's partner Heirloom one of two DAC firms in Project Cypress](#)

## Australia

### Safeguard Mechanism

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

### AU\$15b National Reconstruction Fund

- Up to AU\$3b for renewables and low-emission technologies & AU\$1b for value-adding in resources.

### AU\$1.9b Powering the Regions Fund

- AU\$400m over 3 years for Critical Inputs to Clean Energy Industries, such as steel, cement & lime, & alumina

### Carbon Capture Technologies Program

- AU\$141m for hard-to-abate industries, such as cement

### Critical Minerals Strategy

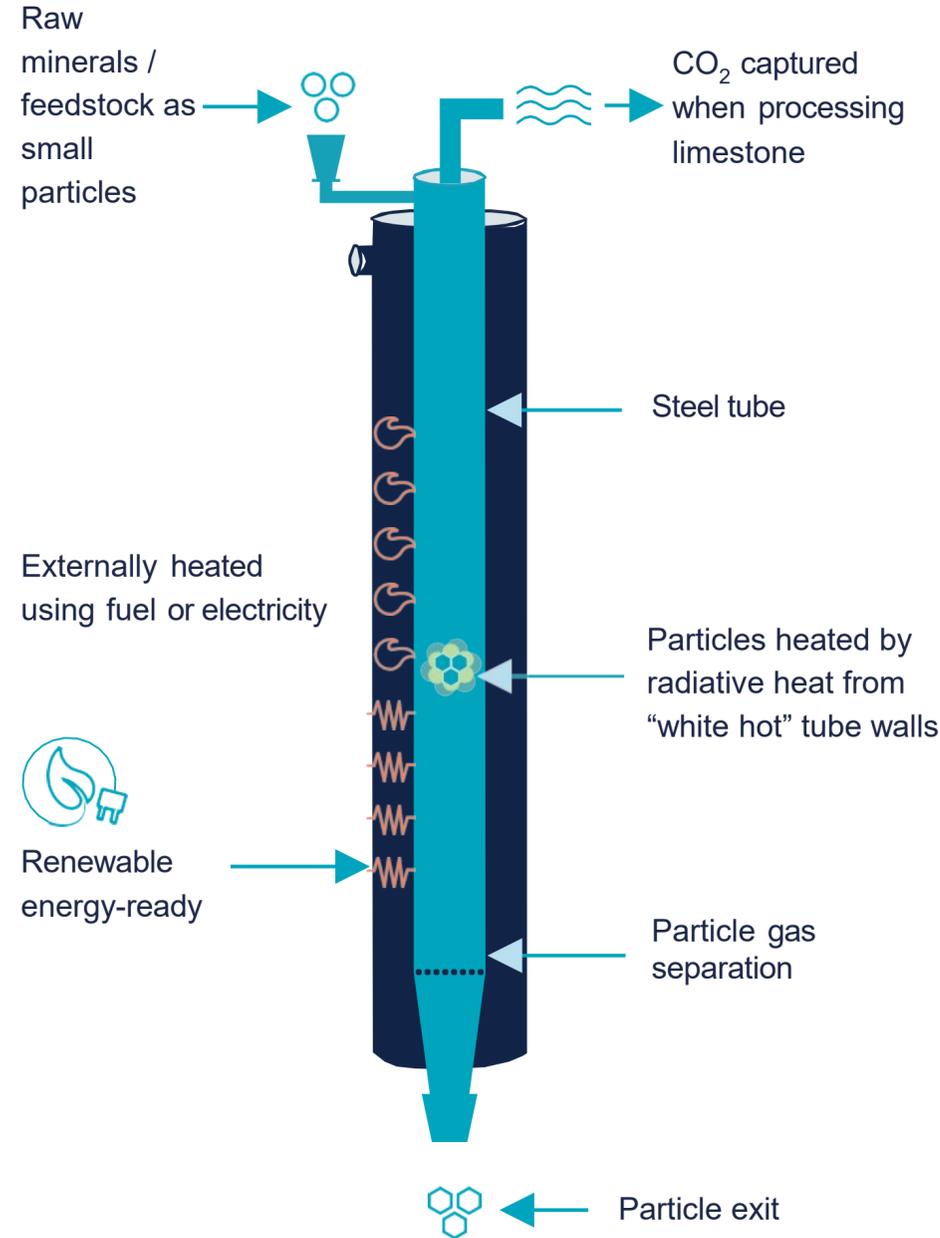
- [Nov 2024: Value-add, downstream processing & decarbonisation – additional AU\\$2b funding](#)

### Carbon Border Adjustment Mechanism

- [Nov 2024: Review of an Australian CBAM underway](#)

# Calix's Core Platform Technology

A new way to “heat stuff up”, for industrial decarbonisation...



**CO<sub>2</sub> CAPTURE**

Limestone contains nearly half by weight CO<sub>2</sub> – when heated this CO<sub>2</sub> is released and makes its way out the top of the tube as a nearly pure stream, ready for utilisation or sequestration

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**RENEWABLE ENERGY-READY**

Compatible with electricity and alternative fuels to provide viable, flexible and economical pathways to sustainable processing of minerals such as limestone, spodumene, green iron and alumina.

**28 patent families covering core technology & applications.**



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# One Decarbonisation Technology – Multiple Applications

Our technology is addressing industrial decarbonisation for some of the world's largest industries...



## Cement & lime



“Low Emissions Intensity Lime and Cement”

Cement and Lime ~8% global CO<sub>2</sub> emissions

~1.4 billion tonnes of unavoidable CO<sub>2</sub> to be captured annually by 2050<sup>1</sup>



## Direct Air Capture



**Zero emissions lime as a sorbent for atmospheric CO<sub>2</sub>**

Up to 10 billion tonnes of CO<sub>2</sub> per annum removal may be needed to limit global warming to 1.5°C<sup>2</sup>



## Lithium



**Low-carbon, low-waste, value-add ‘mid-stream’ processing to lithium at the mine site**

6x growth in lithium carbonate & equivalents market expected by 2030<sup>3</sup>



## Alumina

**Electrifying Aluminium Oxide production**

Global Alumina production on steady growth past 141.5 Mtpa in 2021<sup>4</sup>

Second largest metal industry globally after iron / steel

Aluminium industry responsible for about 3 % of global CO<sub>2</sub> emissions<sup>6</sup>



## Iron & steel

**ZESTY**

**Electrifying Iron production with Green Hydrogen**

~ Iron and Steel 7-9% global CO<sub>2</sub> emissions<sup>5</sup>

~80-85% CO<sub>2</sub> is from converting iron ore to iron<sup>5</sup>



# Our Strategy – Equity farm-in to subsidiaries, plus license fees...



2021

93% equity  
30% license / royalty fees, regardless of equity



€15m for ~7% equity, of 70% of the royalty income stream

2023

AU\$17.5m for 45% equity



AU\$65m for 55% equity



Cement & lime



Direct air capture

Lithium Salt Midstream Demonstration Project (and Licensing Company)



Lithium

Watch this space !



Alumina

Watch this space !



Iron & steel

License Fees  
(min "X" € / TCO<sub>2</sub>)

License Fees  
(min US\$3/TCO<sub>2</sub>)

License Fees  
(% revenue)

License Fees  
(% revenue?? - TBD)

License Fees  
(% revenue?? - TBD)



Other cement and lime companies



Expansion

Hard-rock lithium industry

Market Size

1.4 BTpa CO<sub>2</sub>

Targeting > 1 BTpa CO<sub>2</sub>

US\$7Bpa\*

US\$45.5Bpa\*\*

US\$640Bpa\*\*\*

\*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>

\*\*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.>

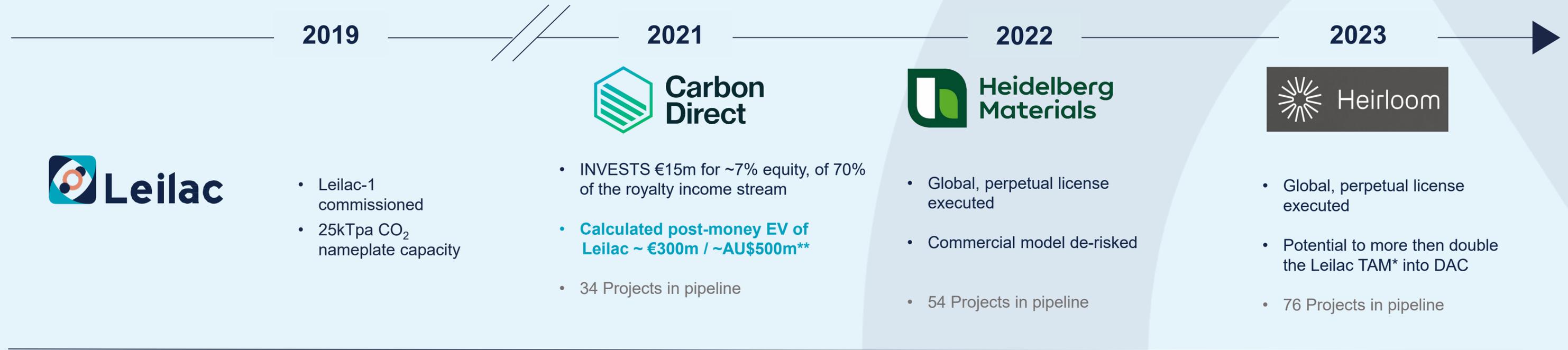
\*\*\*Estimated as US\$400 per tonne of iron @ 1.6BTpa <https://www.statista.com/statistics/589979/metal-content-of-the-global-iron-ore-production/>

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# Valuing the Opportunity Leilac and Svante Inc...benchmark ?

Since 2021, we have undertaken significant commercial de-risking and expanded the total addressable market

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## Svante Benchmark ?

- Power plant pilot commissioned
- ~10kTpa CO<sub>2</sub> nameplate capacity

- First cement pilot commissioned
- ~0.4kTpa CO<sub>2</sub> nameplate capacity



- Cap raise of US\$100m, late 2021
- Post-money valuation not disclosed (likely > US\$300m / AU\$500m)

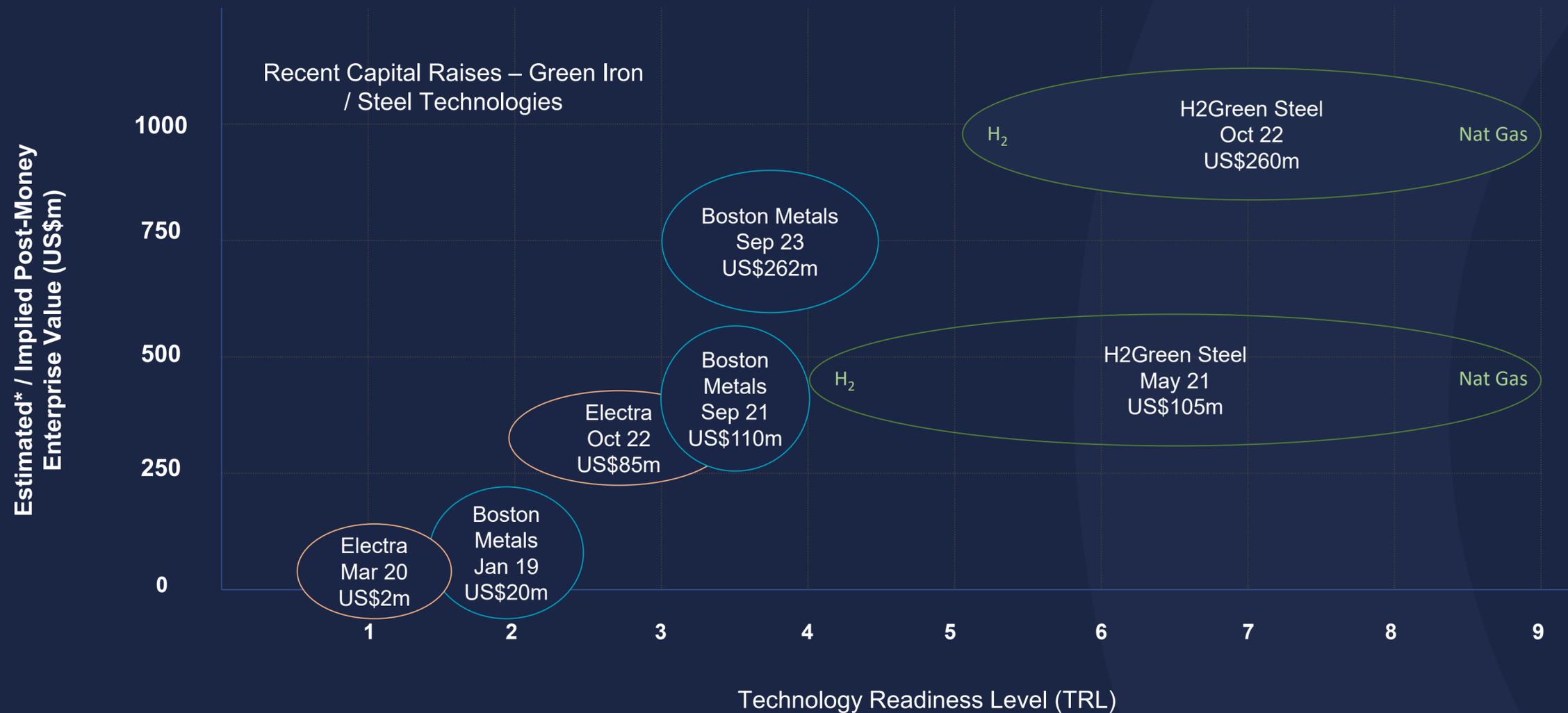
- Cap raise of US\$318m, Dec 2022:
- **Post-Money Valuation > US\$1b\* / AU\$1.5b**

Unknown / unstated projects in pipeline  
Unknown / unstated end-user licences



# Valuing the opportunity - iron and steel

Significant valuations look to have been achieved for competing green iron technologies



Midrex technology – TRL9 for Nat Gas, maybe 6 for H<sub>2</sub>\*\*

No data on production capacity – still lab scale

No data on production capacity – still lab scale

## Calix ZESTY TRL ??

- Core Tech definitely “out of the lab”
- Current piloting at up to ~500 Tpa feed rates
- Basis of Design complete for 30kTpa Demonstration Plant\*\*\*

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# Alumina - an emerging opportunity

Calix's renewable / electric calciner solution is highly prospective for lower emissions alumina production

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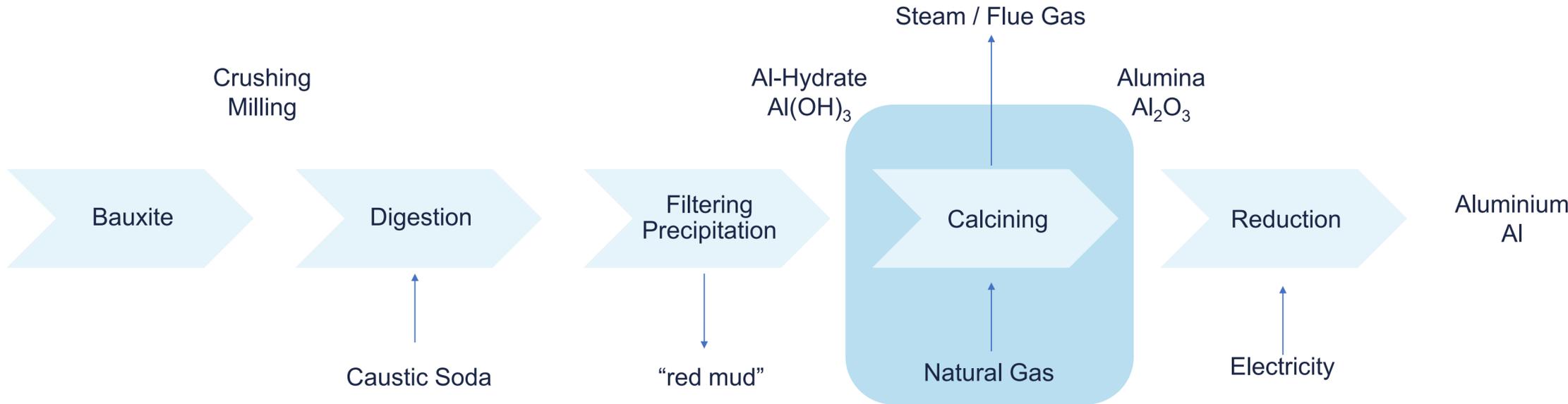
**Market Tailwinds - Alumina**

- Global production 141.5 MT\*, CAGR 4.7% to 2032
- Increasing costs of natural gas
- Net zero pressures
- Alumina refineries are already approaching their maximum cost and energy efficiency using existing technologies

**Calix Technology – Key Features**

**Potential to:**

- Target lowest energy
- Achieve opex parity with natural gas
- Offer grid load balancing
- Recovery and re-use of steam



**CALIX FIRST TESTED ALUMINA IN 2015, AND RECENT TESTING CONTINUES TO CONFIRM HIGH POTENTIAL**

Competitive Technology Comparison			
	Steam recycle ?	Achieve Near-Zero CO <sub>2</sub> ?	Cost
Hydrogen Combustion	Possible / Difficult	Yes	High
Electric pre-calcination / gas heating	No	Nat gas still required	?
Electric Rotary Kiln	Yes	Yes	Efficiency? low TRL
Calix	Yes	Yes	Target lowest

\*Statista 2021: <https://www.statista.com/statistics/799525/global-alumina-production/>  
\*\*<https://www.precedenceresearch.com/alumina-market>

# Technical Development - Heavy Industry Low Carbon Transition (HILT) CRC

Several partners in the HILT-CRC are in our main decarbonisation focus areas



Steel Producers



Alumina



Iron Ore Producers



Cement and Lime

## Core Partners



## Affiliate Partners



## Key Partners



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# FY23 Financial Commentary

Balance sheet strength to pursue commercialisation opportunities

- Capitalised today to pursue our operational objectives and committed capital projects over next two years
- Flexibility retained to pursue the right capital / funding strategy for each application and investment opportunities as they arise
- Essentially debt free – can control our own destiny as we pursue our multiple shots on target
- Growing revenues
  - 42% increase in revenues in FY 23, including grants and rebates
  - FY24 expect to see continued growth in sales within Magnesia business [water treatment products], at growing margins, and
  - Growing contribution from paid engineering services

## Calix Limited FY23 financial result highlights



**\$74.5m**  
Cash on hand 30 June 2023  
(30 June 2022: A\$25.0m)



**\$29.6m up 42%**  
FY23 revenue  
(FY22: A\$20.8m)



**\$6.2m up 19%**  
FY23 gross profit  
(FY22: A\$5.2m)



**33% up 18%**  
FY23 gross margin  
(FY22: 28%)



# About Calix

Calix is an environmental technology company that is developing a unique platform technology to solve global challenges in industrial decarbonisation and sustainability.

We are building multiple businesses to deliver positive global impact in CO2 mitigation, sustainable processing, advanced batteries, biotechnology and water treatment.

Because there's only one Earth, and it's already ours.

**Mars is for quitters !**

2005  
FOUNDED

ASX2018

UNGC  
signatory  
= SINCE 2020 =

120+  
employees

A\$120m  
technology investment

9 operational  
SITES

ACTIVE IN

28 PATENT families

7 countries 5 continents



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# Board of Directors



**Peter Turnbull, AM**  
Non-Executive Chair  
(Retiring 2024)

- Experienced Chair and Non-Executive Director with significant board and senior executive experience in the Australian and global resource, energy and technology commercialisation sectors.
- Non-Executive Director of Karoon Energy Ltd. (ASX: KAR), Chair of medtech Auxita Pty Ltd, Chair of Airlie Energy, Chair of QADO Group/QADO Ventures and President of the Chartered Governance Institute (London).
- Chair of Calix Remuneration and Nomination Committee, and Member of Audit and Risk Management Committee.



**Alison Deans**  
Non-Executive Director  
(Chair-Elect)

- Chair of Cochlear Limited (ASX: COH), Non-Executive Director at Ramsay Health Care Limited (ASX: RHC), and Non-Executive Director at Deputy Group Pty Ltd. Ms Deans is also a member of the Investment Committee at Main Sequence Ventures (CSIRO's innovation fund) and a Member of the AICD Corporate Governance Committee. Ms Deans' previous directorships include Westpac Banking Corporation, Insurance Australia Group Limited and Social Ventures Australia.
- In her executive career, Ms Deans was previously the CEO of eBay Australia and New Zealand, CEO of eCorp Limited, CEO of Hoyts Cinemas, CEO of netus Pty Ltd, and a consultant with McKinsey & Company. Ms Deans holds a MBA from the Stanford Graduate School of Business and a MA (Physics) from Cambridge University.



**Helen Fisher**  
Non-Executive Director

- CEO and Managing Director of Bio Capital Impact Fund (BCIF), a Non-Executive director and Chair of the Audit and Risk Management Committee of Paradigm Biopharmaceuticals Ltd (ASX:PAR) and Chair of the Victorian branch of AusBiotech.
- Previously a partner of Deloitte for over 11 years, and led Deloitte's life sciences practice in Australia for 5 years, specialising in the financial services sector, with significant M&A transactions and strategic tax advice to publicly listed and large multinational companies.
- Chair of Calix Audit and Risk Management Committee.



**Phil Hodgson**  
Managing Director & Chief Executive Officer

- 14 years of multidisciplinary experience with Shell, including as the General Manager and Alternate Director of its subsidiary Fuelink Pty Ltd, a \$700m revenue, 300-employee distribution and sales subsidiary.
- 7 years running a private consultancy providing strategy and M&A services across energy, food, infrastructure and water sectors.
- Joined Calix in 2013 as CEO, became a Director in 2014.



**Dr Mark Sceats**  
Executive Director & Chief Scientist

- Co-founder of Calix, and a member of Calix's Technology Committee.
- Qualified physical chemist with over 52 years' experience, numerous academic roles, and numerous fellowships and recognitions.
- CEO of the Australian Photonics CRC for 14 years.
- Fellow of the Australian Academy of Technological Sciences and Engineering (ATSE).
- Author of more than 165 academic papers in physical chemistry and inventor of 55 patented inventions.



# Glossary

Term	Meaning
Aluminium (Al)	Chemical element with the symbol Al
Anode	The negative electrode of a battery
Antimicrobial	Antimicrobial products kill or slow the spread of microorganisms, including bacteria, viruses and fungi.
AMR	Antimicrobial resistance – the development of resistance in bacteria, viruses, fungi and parasites to antimicrobials.
ARENA	The Australian Renewable Energy A
ASX	The Australian Securities Exchange
APVMA	Australian Pesticides and Veterinary Medicines Authority
BATMn	Calix's core kiln technology – electrified – for battery and catalyst materials production
BOD	Basis of Design
CAGR	Compound Average Growth Rate (%)
Calcium (Ca)	Chemical element with the symbol Ca
Carbonation	The capture of carbon dioxide by contacting with lime (calcium oxide), to form limestone (calcium carbonate)
Cathode	The positive electrode of a battery
CCS	Carbon Capture and Storage
CCUS	Carbon Capture, Utilisation and Storage
CO <sub>2</sub>	Carbon Dioxide
Copper (Cu)	Chemical element with the symbol Cu
CRC	Cooperative Research Centre – Australian Government supported industry-led collaborative research centres
CRC SAAFE	Cooperative Research Centre Solving Antimicrobial Resistance in Agribusiness, Food, and Environments
DAC	Direct Air Capture – the extraction of carbon dioxide directly from the atmosphere
EAF	Electric arc furnace – a furnace that heats material by means of an electric arc between two electrodes

# Glossary

Term	Meaning
EAP	Employee Assistance Program
EBITDA	Earnings Before Interest, Tax, Depreciation and Amortisation
Electrode	The material that stores the lithium ions in a charged (anode) or discharged (cathode) state in a lithium-ion battery
Electrolyte	The medium that allows ions to move between the battery electrodes, via the separator
ESG	Environment, Social and Governance considerations
FEED	Front-End Engineering Design
FID	Final Investment Decision
Fines	Small particles, which are usually very difficult to handle in kilns etc as they simply get blown out
Green Hydrogen	Hydrogen that is produced from an electrolyser using renewable energy
Goethite	A mineral that is an ore of iron
HBI	Hot Briquetted Iron – “bricks” of relatively high purity iron ready for steel-making
H-DRI	The process of reducing iron ore to metallic iron with hydrogen as the reductant
Hematite	A mineral that is an ore of iron
HILT CRC	Heavy Industry Low-carbon Transition Cooperative Research Centre
HPO	“Hierarchical Porous Onion” - a crystal structure of lithium manganese oxide resembling tiny onion layers – allowing both strength and easier passage of lithium ions
Hydrometallurgy	A metal recovery method used to obtain metals from ores and waste materials
Iron (Fe)	The chemical element, represented by “Fe” on the periodic table
Iron Ore	Iron oxide mixed with various other minerals, as mined and “pre-processed” (purified) as best as possible
Leilac	Calix’s core kiln technology for Low Emissions Intensity Lime and Cement production with CO <sub>2</sub> capture
LFP	Lithium Iron Phosphate – a battery cathode material

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# Glossary

Term	Meaning
<b>Process emissions</b>	Process emissions are inherent to the chemical reaction and are released directly and unavoidably from the chemical processing of raw material. They are distinct from energy related emissions that may result from the consumption of fuel to heat the reaction.
<b>SDGs</b>	The UN's Sustainable Development Goals or Global Goals are a collection of seventeen interlinked objectives designed to serve as a "shared blueprint for peace and prosperity for people and the planet, now and into the future."
<b>Separator</b>	The barrier between the anode and the cathode that prevents them touching, inside the battery
<b>Siderite</b>	A mineral that is an ore of iron
<b>SLP</b>	Single layer pouch cells – a soft battery design where most of the cell components are enclosed in a aluminium-coated plastic film.
<b>Sodium (Na)</b>	Chemical element with the symbol Na
<b>Spodumene</b>	A high lithium-containing ore, and the source of the majority of the world's lithium supply
<b>α-Spodumene</b>	A tight Li-crystal formation, from which extraction of Li is difficult
<b>β-Spodumene</b>	A loose Li-crystal formation, from which extraction of Li is much easier than the alpha-form
<b>Reduce / Reduction</b>	The process by which oxygen is removed
<b>Reductant</b>	A material that, through its chemical properties, carries out reduction
<b>RDF</b>	Refuse-derived fuel – a fuel produced from various types of waste
<b>Sponge Iron</b>	Iron Ore that has been reduced (had the oxygen removed)
<b>Steel</b>	Mainly iron, with some carbon and other trace metals such as nickel, manganese etc depending upon the grade of steel being made
<b>Sulphur (S)</b>	Chemical element with the symbol S
<b>TAM</b>	Total Addressable Market
<b>Tpa</b>	Tonnes per annum
<b>TRL</b>	Technology Readiness Level, as measured on the NASA scale
<b>UNGC</b>	The United Nations Global Compact, the world's largest corporate sustainability initiative
<b>Wh / kWh</b>	Watt-hours / kilowatt-hours - a measure of energy
<b>ZESTY</b>	Calix's Zero Emissions Steel TechnologY

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# Glossary

Term	Meaning
<b>LHM</b>	Lithium Hydroxide Monohydrate – used in the production of cathode active materials for lithium-ion batteries
<b>Lithium (Li)</b>	Chemical element with the symbol Li
<b>Lithium-phosphate / Lithium Salt / “Mid-Stream” Lithium</b>	A form of lithium that is high in lithium content, to be shipped and utilised by battery producers
<b>Lithium ion</b>	The ionic form of lithium (Li+) – a positively charged atom of lithium
<b>LMO</b>	Lithium Manganese Oxide – a battery cathode material
<b>LNMO</b>	Lithium Nickel Manganese Oxide – a battery cathode material
<b>LTO</b>	Lithium Titanium Oxide – a battery anode material
<b>Manganese Carbonate (MnCO<sub>3</sub>)</b>	Form of manganese used mainly in agriculture as a fertiliser supplement
<b>Magnesium (Mg)</b>	Chemical element with the symbol Mg
<b>Manganese (Mn)</b>	Chemical element with the symbol Mn
<b>Magnetite</b>	A mineral that is an ore of iron
<b>Metallurgical Coal</b>	Very high carbon coal
<b>MgO</b>	Magnesium Oxide
<b>MHL</b>	Magnesium Hydroxide Liquid
<b>MOU</b>	Memorandum of Understanding
<b>Nanoporous</b>	A material with a regular, porous structure, with a pore size generally less than 100 nanometres.
<b>Nickel (Ni)</b>	Chemical element with the symbol Ni
<b>NCA</b>	A battery cathode material made from nickel, aluminium and cobalt
<b>NCM, or NMC</b>	A battery cathode material made from nickel, manganese and cobalt
<b>Pelletisation</b>	The formation of pellets from finer materials to aid in handling
<b>Potassium (K)</b>	Chemical element with the symbol K

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