

## ASX Announcement

August 4, 2020

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### Calix – CO<sub>2</sub> market opportunity – presentation

**Sydney, Australia | August 4, 2020** – Calix Limited (ASX: CXL 'Calix' or 'the Company') is pleased to provide a copy of the presentation – CO<sub>2</sub> market opportunity - that it will present at the NWR Small Cap Conference to be held at 11am, Tuesday 4 August 2020.

This announcement has been authorised for release to the ASX by:-  
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## About Calix

Calix is a team of dedicated people developing a unique, patented technology to provide industrial solutions that address global sustainability challenges.

The core technology is being used to develop more environmentally friendly solutions for advanced batteries, crop protection, aquaculture, wastewater and carbon reduction.

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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# NWR Small Cap Conference Presentation

August 2020

ersonal use only



# 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 4<sup>th</sup> August, 2020. The information in this presentation is a general background and does not purport to be complete.

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## FINANCIAL DATA

All dollar values are in Australian dollars (\$) or A\$) and financial data is presented as at or for the half-year ended 31 December 2019, unless stated otherwise.

## PAST PERFORMANCE

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# Calix Limited Business Overview



**Growing Sales Revenues**  
generated from water  
treatment products, with  
growing exports and recent US  
acquisition  
**Our Feb FY20 Guidance**  
**remains \$12.5m to \$14m**  
**UP between 280% to 320% yoy**



**Control of Supply Chain**  
from mine, to  
manufacturing facility, to  
local mixing plants, to  
customer / distributor



**Quickly scalable for**  
minimal (organically  
funded) capex

**Cash-positive and virtually no debt, with growing  
revenues, secure supply chain, quickly scalable and  
funded development pipeline.**



**Robust business  
model** with existing  
commercialised markets in  
“essential services” waste  
water and food, largely  
unaffected by COVID-19



**Funded Development in**  
Australia (\$5m for agriculture,  
advanced batteries) and  
Europe (\$47m for CO<sub>2</sub> capture  
for cement and lime)

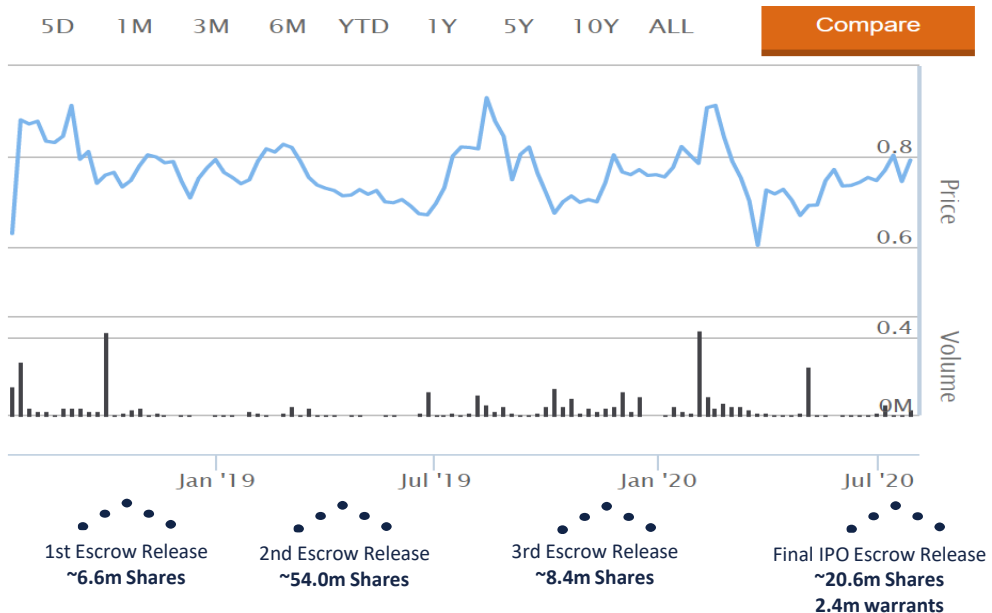


# Listed on the ASX in July, 2018

ASX:CXL



## Share Price Performance Since Listing



## Further Equity Detail

As at 31 July 2020

|   |               |
|---|---------------|
| Free Float  | 147.4m shares |
| Warrants to be exercised by July 2022 (\$0.66 Strike Price) | 2.4m warrants |
| Employee Incentive Scheme Rights                            | 7.8m rights   |

## As at 30 June 2020

|                                   |                   |
|-----------------------------------|-------------------|
| Shares on issue                   | ~147.4m           |
| Share price for IPO Capital Raise | \$0.53 per share  |
| Share price on IPO                | \$0.62 per share  |
| Share price                       | \$0.765 per share |
| Market capitalisation             | ~\$112.8m         |
| Cash (company is debt free)       | \$11.1m           |

## Major shareholders






As at 31 July 2020

|                                  |       |
|----------------------------------|-------|
| Board & Management               | 17.5% |
| Perennial Value Management       | 14.1% |
| Sculptor Capital Management      | 11.5% |
| Nicholas Merriman and associates | 8.9%  |
| Australian Super Pty Ltd         | 6.1%  |
| Paul Crowther                    | 5.7%  |
| Thorney Investments              | 5.6%  |
| Acorn Capital                    | 5.4%  |



# Calix's Existing & Target Markets – with Global Appeal



|   | IN-MARKET   |  | PRE-COMMERCIAL   |  |   | R&D   |   |                              |
|---|---|--|--|--|---|---|---|------------------------------|
|   |  |  |  |  |  |  |  |                              |
|   | WATER AND WASTE WATER   |  | AQUACULTURE & FRESH WATER REMEDIATION  |  | AGRICULTURE CROP PROTECTION   |   | CO <sub>2</sub> MITIGATION LIME & CEMENT  | ADVANCED BATTERIES           |
| Revenue model   | Direct sales model Australia / NZ / US  |  | SE Asia Distributors   |  | Supply under margin-share   |   | License technology to industry / royalty basis                                      |                              |
| Markets   | Active: Australia, NZ and US<br>Target: EU, Global                                |  | Active: South East Asia<br>Target: Global  |  | Active: EU<br>Target: Global  |   | Active: EU<br>Target: Global  |                              |
| Strategic play  | Partnering / portfolio potential  |  |  |  | License and possible equity play to crop majors                                     |   | License and possible equity play to cement / lime Eng. Tech companies               |                              |
| TAM <sup>1</sup> \$A billion  | 36.7  |  | 1.5  |  | 9.8   |   | 10.8  |                              |
| All based upon Calix's highly active magnesium hydroxide (MHL) technology |   |  |  |  |   | Pilot plant in Belgium  |   | Pilot plant at Bacchus Marsh |

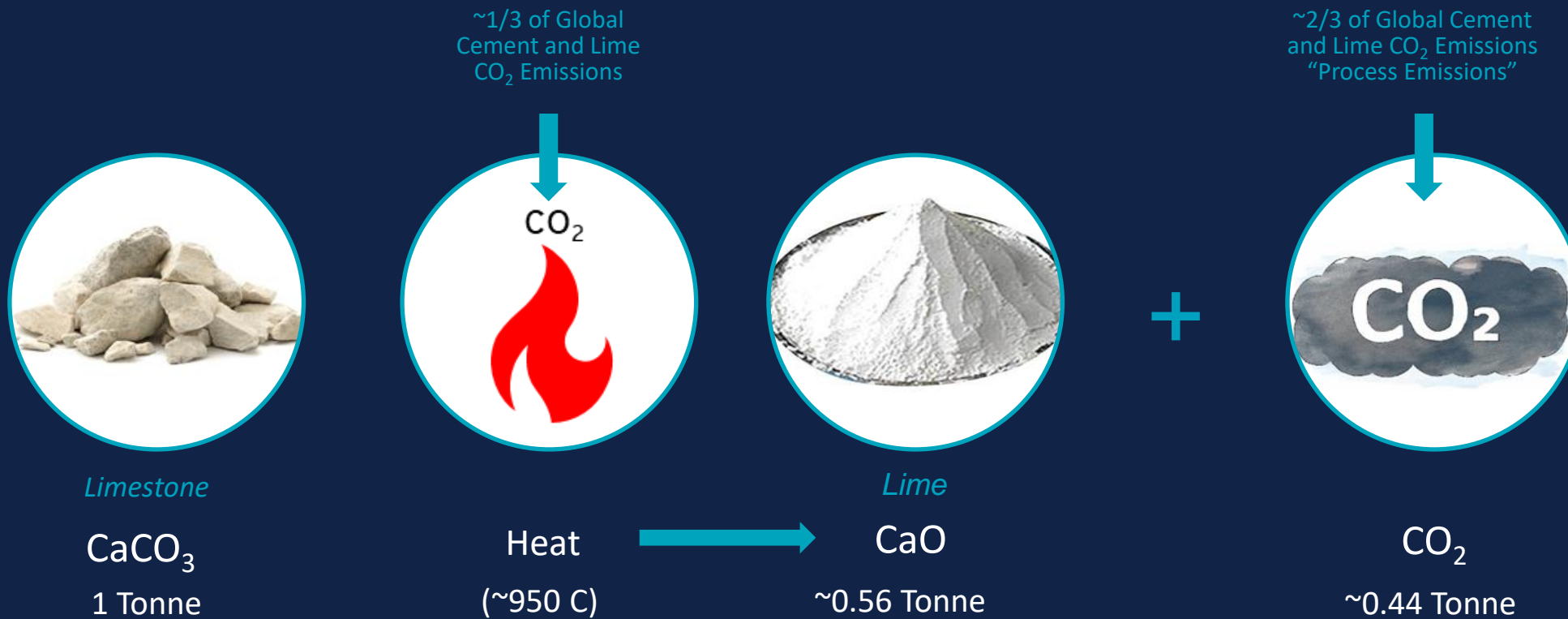
<sup>1</sup> Frost & Sullivan: Market Opportunity for Calix Flash Calcination, dated 17 April 2018. Refer to Section 4 of the Calix Prospectus for risks associated with the competitive environment, retaining and winning customers and market development.

# The CO<sub>2</sub> Problem

LIMESTONE IS THE SECOND MOST UTILISED SUBSTANCE ON EARTH



Cement and lime contribute between 5% and 8% of global anthropogenic CO<sub>2</sub> emissions - about 2.2 BT per annum\*  
Around 2/3 of those emissions are unavoidable – coming from the raw material (limestone)

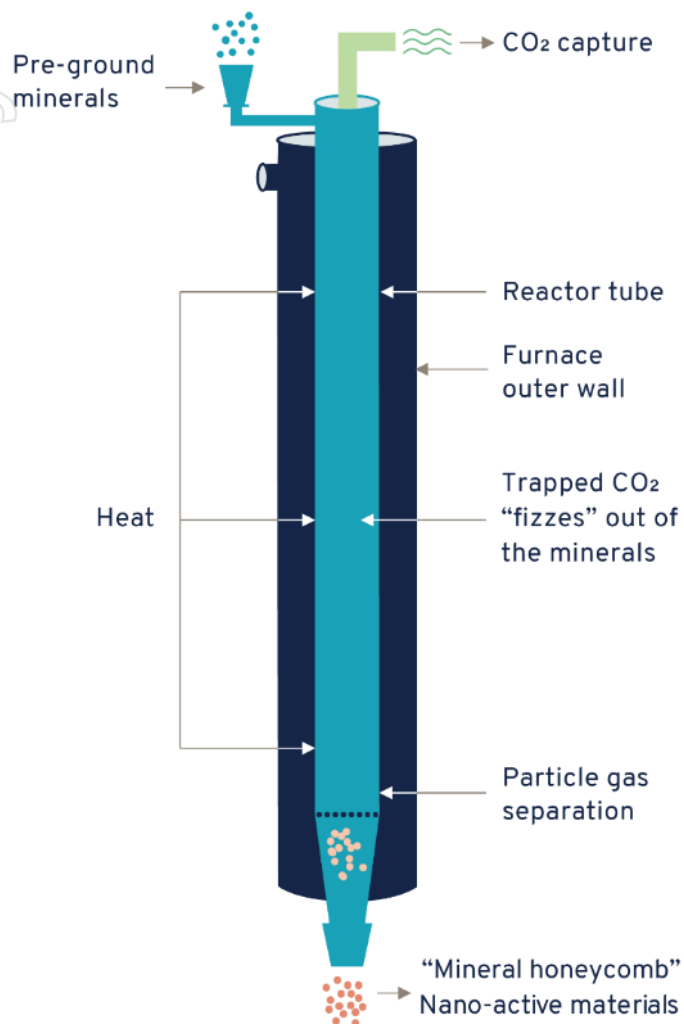


\*Global CO<sub>2</sub> emissions from cement production, 1928–2018 Robbie M. Andrew CICERO Center for International Climate Research, Oslo 0349, Norway, Earth Syst. Sci. Data, 11, 1675–1710, 2019 <https://doi.org/10.5194/essd-11-1675-2019>



# The CO<sub>2</sub> Solution

CALIX'S CORE TECHNOLOGY



## CO<sub>2</sub> Capture

When processing limestone, cement meal, or magnesite, gas exhaust is pure CO<sub>2</sub>

## "LEILAC" (Low Emissions Intensity Lime and Cement)

## Low Cost + Very High Surface Area (Reactive) Products for:

- Wastewater
- Aquaculture
- Lake remediation
- Crop protection
- Advanced batteries

## A New Type of Kiln



27 patent families covering core technology and applications



>\$60m has been invested to date in developing the technology.

# Cement – the Size of the Opportunity

CO<sub>2</sub> MITIGATION FOR CEMENT



If...

...LEILAC was proven the “best available technology” by 2025...

...and it was possible to fit the LEILAC technology to a 1 million tonne cement plant every 3 to 4 days...

...this would still not meet the global CO<sub>2</sub> capture capacity required\* assuming full de-carbonisation of the cement industry by 2050

\*Assuming 12 to 23 % growth in the cement market to 2050 (IEA 2019)

# Technology – fully funded to develop to demonstration scale

CO<sub>2</sub> MITIGATION FOR LIME AND CEMENT



**“CFC-15000”**



**Built**

**2013 - Australia**

25kTpa CO<sub>2</sub> from Magnesite – commercial scale

Temperature: 760 C

Capital: ~ \$18m

Over 7 years operation, low maintenance / OPEX

**“LEILAC-1”**



**2019 - Belgium**

25kTpa CO<sub>2</sub> from cement and lime (~5% of 1MTpa Cement plant)

Temperature: 960 C

Capital: ~ \$13m (from EU H2020 Grant)

Already small commercial scale for lime

Technology concept proven

>95% purity CO<sub>2</sub>, Achieved 70% Max Throughput for cement

Pushing to Operational Limits to end 2020

**“LEILAC-2”  
Demonstration**

**Funded**



**“LEILAC-3”  
Full Scale**

Up to 500kTpa

**In Planning**



**Target 2023 - Germany**

100kTpa CO<sub>2</sub> from cement (~20% of 1MTpa Cement plant)

Fully Integrated for cement

Capital: \$27m (from EU H2020 Grant) + \$15m Industrial Partners

Test runs through to end 2024

**Target ASAP after  
L-2 EU or US**

Most likely retrofit

Industry- and grant-funded, or possible risked equity



# Calix's Technology is Attracting Global Players

CO<sub>2</sub> MITIGATION FOR LIME AND CEMENT



## CALIX'S PARTNERS IN LEILAC-1 AND LEILAC-2...

**HEIDELBERGCEMENT**



# Competitive Landscape

## CO<sub>2</sub> MITIGATION FOR LIME AND CEMENT



\*TRL = NASA “Technology Readiness Level”, a scale from 1 (conceptual) to 9 (commercialised and deployed repeatedly). Figures are Calix estimates for cement application

**LEILAC represents one of the most advanced, and also potentially the lowest theoretical cost solution to CO<sub>2</sub> mitigation**

| Option                               | TRL*<br>(Cement)   | Cost € / TCO <sub>2</sub><br>Avoided <sup>e</sup>    | Advantages   | Challenges  | Development Pathway   |
|--------------------------------------|--------------------|--|--|---|---|
| Amine                                | 6 <sup>a</sup> - 7 | 55 – 189 <sup>f</sup>                                | Most advanced technically<br>Can use some lower grade (waste) heat                         | Millions of tonnes of spent amine to atmosphere – uncertain impact<br>Energy penalty<br>High CAPEX and OPEX | <b>SECURED</b><br>Norcem Project<br>(400kTpa CO <sub>2</sub> ) to TRL 8 by 2025         |
| LEILAC                               | 5 - 6 <sup>b</sup> | < 25 <sup>i</sup><br>(To be confirmed post LEILAC-1) | Lowest theoretical cost<br>Easily electrified – energy agnostic<br>No new chemicals needed | Heat and process integration - retrofit   | <b>SECURED</b><br>LEILAC-2 Project<br>(100kTpaCO <sub>2</sub> ) to TRL 7/8 By 2024      |
| Svante<br>(Temp swing – MOF sorbent) | 5 - 6 <sup>j</sup> | ? (Capital Cost ½ Amine)<br>OPEX ?                   | No new chemicals needed  | OPEX / Footprint at scale ?<br>MOF Performance over time ?  | <b>PLANNED</b><br>Holcim Colorado Project<br>(725kTpa CO <sub>2</sub> ) to TRL 8 Date ? |
| Calcium Looping                      | 5 <sup>c</sup>     | 26.4 <sup>g</sup> – 58.6                             | No new chemicals needed  | Heat and process integration – integrated retrofit  | <b>UNCLEAR</b><br>Taiwan Cement no firm commitment<br>Beyond CLEANKER unclear           |
| Oxyfuel                              | 4 <sup>d</sup>     | 42 <sup>f</sup> - 66                                 |  | Air ingress<br>Air sep energy costs<br>Gas flows  | <b>PLANNED</b><br>Mergelstetten Project<br>(725kTpa CO <sub>2</sub> ) to TRL 6/7 Date?  |

a. Based upon Anhui Conch capture project 50kTpa CO<sub>2</sub> capacity

b. Based upon LEILAC-1 project 20kTpa CO<sub>2</sub> capacity

c. Based upon Taiwan Cement / ITRI 350 Tpa CO<sub>2</sub> capacity, similar “La Pereda” Spain. Also being developed in integrated cycle in CLEANKER project

d. Based upon CEMCAP Project – some elements tested at lab scale and in relevant industrial environment. And Carbon Capture in the Cement Industry: Technologies, Progress, and Retrofitting in [Environmental Science & Technology](#) 50(1) - December 2015

e. Based upon 1 Mtpa Cement Plant – NOAK technology deployed at scale. Includes OPEX + annualised CAPEX (12.5% capital charge, where known)

f. The Swing Adsorption Reactor Cluster for Post-Combustion O<sub>2</sub> Capture from Cement Plants – *Journal of Cleaner Production* 223 (2019) 692 - 703

g. Lower bound as claimed by ITRI for power production – no public domain information for cement. Higher bound as per the CEMCAP project

h. As tested in CEMCAP project – CO<sub>2</sub> Capture in the Cement Industry, Norcem CO<sub>2</sub> Capture Project (Norway) *Energy Procedia* 63 (2014) 6455 – 6463

i. Estimate as presented by Jan Theulen – HeidelbergCement – Futurecem Conference and Exhibition, Brussels, May 2019

j. Based upon 30TPD test unit (10kTpa)

# Market – up to 2030

## CO<sub>2</sub> MITIGATION FOR LIME AND CEMENT



Until 2030, we will target Europe and the US to “Beach-head” the technology

Demonstration Projects for new CO<sub>2</sub> mitigation technologies for cement appear to be best pursued in Europe and the US

These will largely be **RETROFIT** opportunities

### Europe

- ✓ Cement Capacity 175 Mtpa
- ✓ EU Emissions Trading Scheme = Price / Cost on CO<sub>2</sub>
- ✓ “Innovation Fund” from 2020 supporting (~2/3) big capital investments from industry, including for CO<sub>2</sub> infrastructure

### China

- ✓ Cement Capacity 2,200 Mtpa (~55% of Global capacity)
- Chinese Emissions Trading Scheme = Price / Cost on CO<sub>2</sub> for power, but not yet for Industrial emissions
- ✗ No clear monetary incentives (most companies are government-owned)

### India

- ✓ Cement Capacity 280 Mtpa
- ✗ No cement emissions policy
- ✗ No clear monetary incentives

### US

- Cement Capacity 89 Mtpa
- ✓ 45Q Tax Credit EU = Price / Value on CO<sub>2</sub>
- ✓ Some existing CO<sub>2</sub> infrastructure
- ✓ DoE support for early stage project assessments



# Market – up to 2030

## CO<sub>2</sub> MITIGATION FOR LIME AND CEMENT



### Europe and the US putting significant support behind new CO<sub>2</sub> mitigation projects



#### EUROPE



##### Innovation Fund

Energy, CCU/S, Energy Storage

€ 10b funding from 2020 to 2030

Up to 60% contribution

High Innovation

Flagship Projects

(€100's m+)

##### ...Capital Support and CO<sub>2</sub> Penalties

##### Emissions Trading Scheme

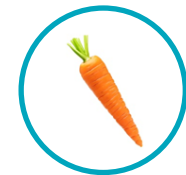
2021 to 2030, 2.2% yoy reduction in free CO<sub>2</sub> permits

Emitters above the “cap” will need to go on-market and buy permits

CO<sub>2</sub> permit price has risen dramatically



#### US



##### EOR CO<sub>2</sub> Value

CO<sub>2</sub> already bought / sold and pipelined for Enhanced Oil Recovery (EOR)

Prices are typically set at a per ton price of about 40% of the price of oil per barrel\*

##### ...CO<sub>2</sub> Value

\* Infrastructure to enable deployment of carbon capture, utilization, and storage in the United States Ryan W. J. Edwardsa,1 and Michael A. Celiaa a Department of Civil and Environmental Engineering, Princeton University, Princeton, NJ 08544

##### 45Q Tax Credit System

Up to end 2024 (lobbying to extend) – new projects in CO<sub>2</sub> abatement > 100 kTpa qualify for tax credit of US\$ 35 / ton CO<sub>2</sub> (if used for EOR, or US\$ 50 / ton otherwise)

# Carbon Capture and Storage (CCS) versus Utilisation (CCU)?

CCS AND CCU



*Putting CO<sub>2</sub> to Use - Creating Value from Emissions – IEA Technology Report September 2019*

CO<sub>2</sub> utilisation is a complement, not an alternative, to CO<sub>2</sub> storage for large-scale emissions reductions.

CO<sub>2</sub> utilisation is not expected to deliver emission reductions on the same scale as carbon capture and storage (CCS), but can assist meeting climate goals as part of a comprehensive approach.

In IEA scenario analysis, even with limited CCS, CCU delivers less than 13% of the emissions reduction that would otherwise be provided from CO<sub>2</sub> storage.

<https://www.iea.org/reports/putting-co2-to-use>

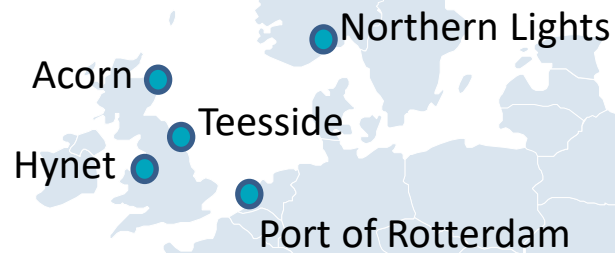
# Market – What to do with CO<sub>2</sub> ?

CO<sub>2</sub> MITIGATION FOR LIME AND CEMENT



## Europe

CO<sub>2</sub> Sequestration (CCS) Hub Development Projects:



Many CCU Projects are also being developed, for example HeidelbergCement's algae project in Morocco, and recycled cement fines CO<sub>2</sub> adsorption

## US

Mainly Enhanced Oil Recovery (EOR) use, for which there is already extensive infrastructure:



Source: Hart Energy/Rextag, 2012

Europe and the US either have, or are targeting significant CO<sub>2</sub> infrastructure

# Market – from 2030

## CO<sub>2</sub> MITIGATION FOR LIME AND CEMENT



From 2030, we will target the largest and fastest growing markets with the technology once “Blueprinted”

Projects for established CO<sub>2</sub> mitigation technologies for cement would target the **largest** and **fastest** growing markets

These will be a combination of **RETROFIT** and **GREEN FIELDS** opportunities

### Europe

- ✗ Very little Cement Sector Growth
- ✓✓ EU Emissions Trading Scheme = Price / Cost on CO<sub>2</sub>  
(Continue to pursue Retrofit opportunities)

### US

- ✗ Very little Cement Sector Growth
- Policy (Tax Credits / DoE support etc) unclear

### Africa, South America

- ✓✓ High % New Build
- Emissions policy unclear

### China

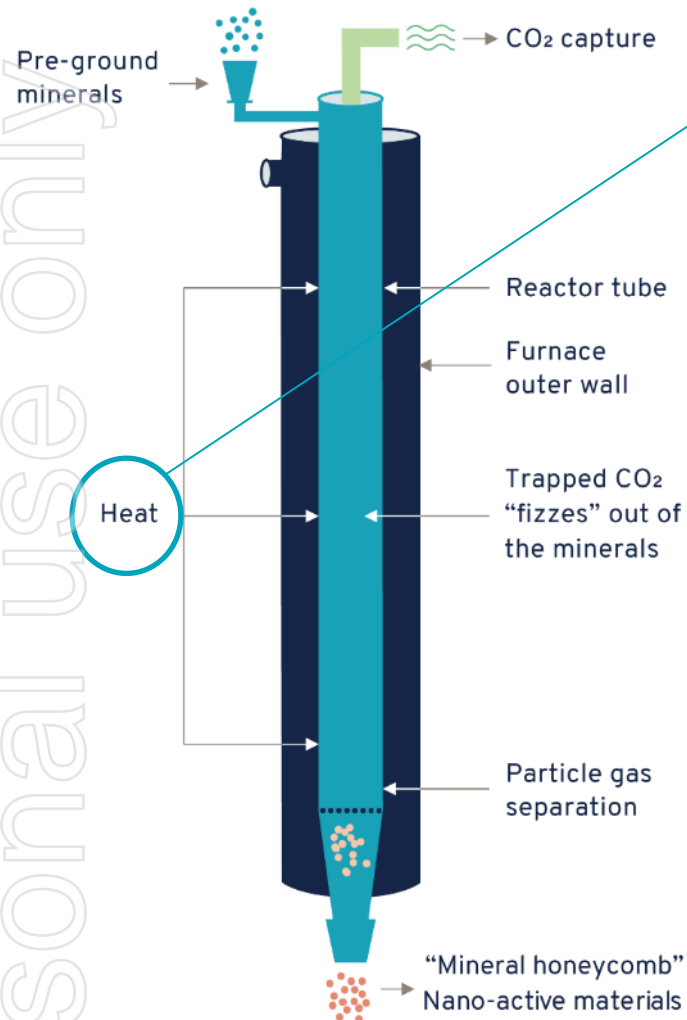
- ✓✓ Cement Capacity 2,200 Mtpa
- ✓✓ High % New Build Replacement
- ✓✓ Chinese Emissions Trading Scheme = Price / Cost on CO<sub>2</sub> for cement highly likely in place, similar to EU

### India

- ✓ Cement Capacity 280 Mtpa
- ✓✓ High % New Build & Replacement
- ✓ Target 60% Renewables target by 2030

# The cement plant of the future ... run on renewable power

CO<sub>2</sub> MITIGATION FOR LIME AND CEMENT – INDUSTRIAL ELECTRIFICATION

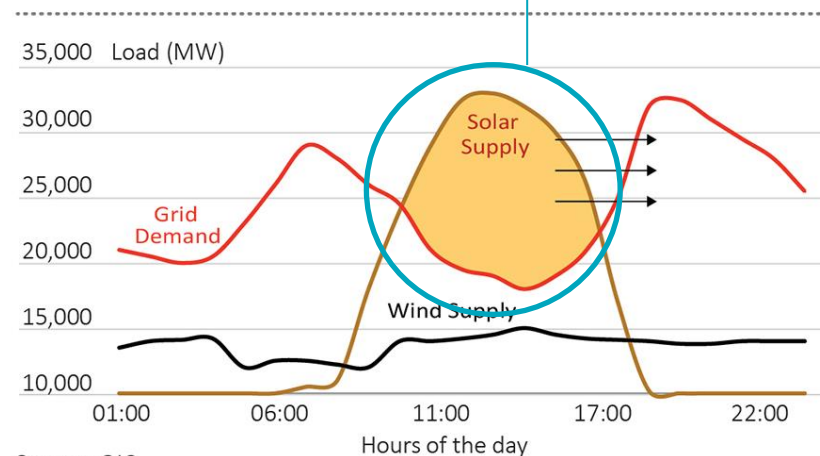


Calix's LEILAC technology is energy-agnostic – “heat” can come from traditional fossil fuels, biomass, hydrogen or even **electricity**...

...thus the LEILAC technology paves the way for **electrification of the cement and lime** industries

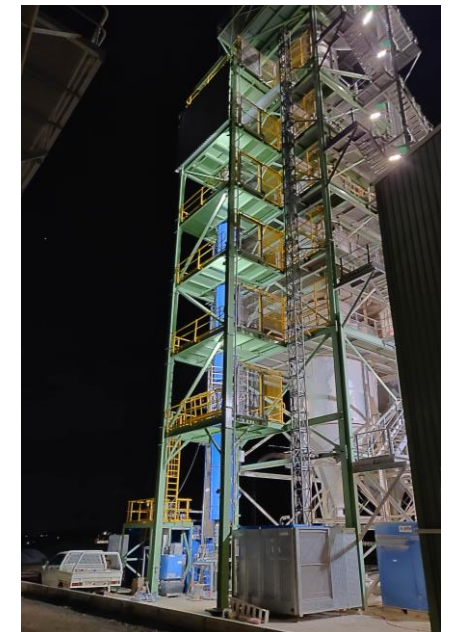
In the LEILAC-2 Project, we are working with Engie's research arm – Engie Laborelec – on electrification studies and **load balancing** opportunities

Load balancing (along with energy storage) will be increasingly vital in stabilising the electricity grid, as higher proportions of renewable generation comes on-stream



Source: QIC

Figure from Queensland Investment Corporation - <https://www.qic.com.au/knowledge-centre/technology-disruptions-affecting-infrastructure-20160414>



Calix's first fully-electric calciner “BATMn” for battery materials research, but also now testing cement and lime

# Other Applications

CO<sub>2</sub> MITIGATION – OTHER CORE TECHNOLOGY OPPORTUNITIES



There are numerous opportunities for Calix’s technology into potentially very large CO<sub>2</sub> markets

| Application                                    | CO <sub>2</sub> Mitigation Potential (Mtpa) | Development Pathway  | Target Commercialisation Timeframe | Key Commercialisation Triggers  |
|--|---|--|------------------------------------|---|
| Magnesia (Refractories)                        | 13  | Core Tech  | ASAP                               | Sustained CO <sub>2</sub> cost / value<br>First (possibly equity risked) project  |
| Lime (Steel, Pulp and Paper, Glass, Water etc) | 350   | Core Tech  | ASAP following LEILAC-1            | Sustained CO <sub>2</sub> cost / value<br>Full technical (operational) proof – LEILAC-1<br>First (possibly equity risked) project |
| Shipping                                       | 800   | Core Tech + Calix “RECAST” Patented System                     | Future...                          | Sustained CO <sub>2</sub> cost / value<br>Full technical (operational) proof  |
| Direct Air Capture (DAC)                       | Potentially Huge – Very Early Stage         | Core Tech + Partner Capture System – Lime or Magnesium Based   | Future...                          | Sustained CO <sub>2</sub> cost / value – US\$45Q + US State-based incentives (eg Cal. US\$180 / ton)                              |
| Base Load Energy Storage Systems (BESS)        | Potentially Huge – Very Early Stage         | Core Tech + SOCRATCES (EU) Project – Lime + Solar Concentrator | Future...                          | Sustained growth in Renewables into grid energy systems   |



# The Opportunity – Significant technical development done

IN SUMMARY...OUR CO<sub>2</sub> BUSINESS



Calix is approaching deployment into huge markets...



Over \$60m already invested, and another \$27m already secured, to develop the technology to commercial demonstration by 2024



## Cement:

TAM > 2BTpa CO<sub>2</sub>

## Multi-\$B Opportunity

Once proven at scale, the opportunity is only limited by speed of deployment



## Other Applications:

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

## Multi-\$B Opportunity

Shipping, Direct Air Capture, Lime (Steel, Water, Pulp and Paper, Glass etc), Baseload Energy Storage Systems



Capital-light business model

+ engineering services revenues

+ licensing / royalty income



At scale, theoretically the cheapest cement and lime CO<sub>2</sub> mitigation option.

Patent Protected

# Board of Directors



**Peter  
Turnbull, AO**  
Non-Executive  
Chair

- Experienced chairman and non-executive director with significant board and senior executive experience in the resource, energy and technology commercialisation sectors
- Current Chairman of Auxita Pty Ltd, non-executive director of Karoon Energy Ltd. (ASX: KAR), the Governance Institute of Australia and the Chartered Governance Institute
- Adjunct-Professor at the University of Queensland (2010 – 2016)
- Chair of Calix Rem and Nom Committee, and member of Calix Audit and Risk Committee



**Jack  
Hamilton**  
Non-Executive  
Director

30 years multidisciplinary experience in local and overseas energy industries, including as a Director of NWS Ventures (Woodside North-West Shelf project)

Currently the Chairman of AnteoTech Ltd (ASX:ADO). Previous Non-Executive Director positions include Renu Energy (ASX:RNE), and DUET Group (ASX:DUE)

Chair of Calix Audit and Risk and Technology Committees, and member of Rem and Nom 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

Joined Calix in 2013 as CEO, became a Director in 2014 and is a member of Calix's Technology Committee



**Lance  
O'Neill**  
Non-Executive  
Director

London-based director of DFB Australia, with 36 years of experience in international securities and investments in the UK, Australia, USA and Far East

Chair of MediaZest Plc and EP&F Capital Plc



**Dr Mark  
Sceats**  
Director And  
Chief Scientist

Co-founder of Calix

Qualified physical chemist with over 46 years' experience, previous roles academic roles, and numerous fellowships and recognitions

Author of more than 140 academic papers in physical chemistry and inventor of 36 patented inventions

Because there's only one Earth...



...Mars is for quitters

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