

# Leilac and Windship awarded £5m funding to demonstrate zero emissions shipping technology

**Sydney, Australia 16 February 2023** – Australian environmental technology company, Calix Limited (ASX: CXL) ("Calix" or "the Company") is pleased to announce that a project ("Project") led by <u>Windship</u> <u>Technology Limited</u> ("Windship"), in partnership with Leilac, Calix's 93% owned subsidiary focused on the decarbonisation of cement and lime, has been awarded £5m (AU\$8.73m<sup>1</sup>) by Innovate UK to demonstrate a novel route to zero carbon shipping.

# Highlights

- The £8m (AU\$13.97m<sup>1</sup>) Project, led by Windship Technology Limited, has been awarded £5m (AU\$8.73m<sup>1</sup>) from Innovate UK.
- The Project aims to demonstrate a low-cost route to decarbonise shipping with a combination of renewably powered propulsion and a lime-based carbon capture solution for remaining emissions.
- As part of the funding, Leilac will receive a grant of £1m (AU\$1.75m<sup>1</sup>) for a work programme of £1.66m (AU\$2.9m<sup>1</sup>) to demonstrate the delivery of lime to an exhaust gas scrubber for CO<sub>2</sub> capture.
- Future installations of the technology will use highly reactive zero emissions lime produced by a Leilac reactor to enable net zero emissions shipping.
- The Project aims to demonstrate the low-cost potential of a decarbonisation solution for shipping that paves the way for zero emissions lime to be used for reducing or eliminating emissions from conventional diesel powered vessels.
- International shipping is responsible for ~2% of global CO<sub>2</sub> emissions.<sup>2</sup>

## Windship and Leilac's partnership for zero emissions shipping

Windship and Leilac are partnering to develop an innovative wind propulsion and carbon capture system that has the potential to offer a low-cost route to low and zero emissions shipping. Together, Windship and Leilac's technologies can enable approximately 50% of the ships power to be provided by renewable energy and emissions from the remaining conventional fuel requirements captured by zero emissions lime. Integration of the carbon capture system with the ships engines can enable waste heat recovery from the capture reaction, further reducing fuel demand. This unique combination of technologies has the potential to deliver a highly economical approach to elimination of emissions from shipping.

Windships' auxiliary power systems use wind propulsion provided by wind rigs, each of which consist of three vertically arranged solid sails. The innovative design provides high-power density and a low centre of effort, and therefore minimal impact on vessel stability. Three triple wing installations can provide sufficient thrust to sail an 80,000 deadweight tonne (DWT) ship without requiring engine power for 60-70% of the journey along typical trade wind routes, dramatically reducing CO<sub>2</sub> emissions compared with standard operating conditions.

<sup>&</sup>lt;sup>1</sup> Based on an exchange rate of 1GBP = 1.75 AUD, as at 15 February 2023

<sup>&</sup>lt;sup>2</sup> <u>https://www.iea.org/reports/international-shipping</u>

For manoeuvring in port, handling in storm conditions or for when wind power cannot be guaranteed, ships must also be fitted with engines. Whilst in future these engines may run off zero emissions fuels, the existing fleet is expected to continue to use diesel for several decades.

Windship systems can be installed on vessels with a flat deck above their cargo, including tankers, bulkers, and LNG tankers.

## Carbon capture for shipping

Lime is a highly effective sorbent for the capture of  $CO_2$  and can be used in a carbon capture system for the abatement of emissions from conventional diesel engines. For this solution to provide a net reduction or elimination of emissions, the lime used for capture must be produced with low or zero carbon emissions, using shore-based decarbonisation of the lime.

Leilac's patented technology can produce low emissions lime by efficiently capturing the unavoidable process  $CO_2$  emissions released from limestone, without additional chemicals or processes. Leilac's technology is compatible with clean energy sources, such as hydrogen and electricity, and also alternative fuels, enabling flexible and economical pathways for the production of zero emissions lime and cement. Leilac's technology is proven at pilot scale, including through its pilot plant, Leilac-1, that has been in operation since 2019 with a capture capacity of 25,000 tonnes of  $CO_2$  per year. A demonstration plant, which aims to prove a low-cost module with a capture capacity of 100,000 tonnes of  $CO_2$  per year is due to open in 2014, paving the way for commercialisation of the technology at any scale.

For shipping, the decarbonised lime will be transferred to the relevant marine vessel, where the shipborne carbon capture process is applied. This system is compatible with a wide range of ship types, including tankers, container ships and cruise liners. It is retrofittable, fuel agnostic, and can be simply scaled to meet the decarbonisation ambitions of each ship. The adoption of lime as a sorbent for ships can also significantly expand the market for low and zero emissions lime.

### **The demonstration Project**

The Project, led by Windship Technology Limited, will use a new patented solid wing sail technology in conjunction with a lime carbon capture system to demonstrate a route to zero emissions for ships fitted with conventional diesel engines.

The Project aims to demonstrate the low-cost potential of the proposed decarbonisation solution for shipping and pave the way for zero emissions lime to be used for reducing or eliminating emissions from conventional diesel powered vessels.

The key objective of the Project is to design, develop, build and demonstrate a novel drive train system consisting of a single powerful wind propulsion device, working together with a trial carbon capture system to pave the route to zero emission propulsion for bulkers and tankers. This will be installed and trialled on a 15,000DWT bulker. The shipborne carbon capture system will ultimately be designed to use highly reactive low emissions intensity lime, produced in an on-shore Leilac reactor, to capture CO<sub>2</sub> from the ship's exhaust gases.

### Decarbonising shipping

International shipping is responsible for ~2% of global CO<sub>2</sub> emissions.<sup>3</sup> The International Maritime Organization has an objective to reduce greenhouse gas emissions by at least 50% by 2050, compared

<sup>&</sup>lt;sup>3</sup> <u>https://www.iea.org/reports/international-shipping</u>

with a 2008 baseline. Accounting for the projected growth of the shipping industry during this time, achieving this goal will require a reduction in emissions of ~80% based on current levels.<sup>4</sup>

Future development and adoption of sustainable transport fuels, such as hydrogen or methanol, together with the required supporting infrastructure, may enable low carbon fuel alternatives for the shipping industry.

When methanol produced with renewable energy and captured CO<sub>2</sub> from industry is used as a fuel, such as in the process described in the recent HyGATE project announcement<sup>5</sup>, of which Calix is a consortium member, the combination with the technology being developed by this Project can deliver net negative emissions from shipping.

## Calix Managing Director and CEO, Phil Hodgson said,

"We are delighted to be partnering with Windship, with the support of the UK Government, to develop a novel decarbonisation approach that combines highly innovative technologies developed in Australia and the UK.

Calcium looping for carbon capture with low emissions lime is an exciting application with significant potential, and we look forward to developing this technology further with the support of our partners."

## Leilac CEO, Daniel Rennie said,

"This project marks a significant step in developing a potential route for the efficient and low-cost decarbonisation of the shipping industry. Marine shipping is a particularly hard-to-abate sector, and the very strong synergies that can be made from leveraging the large-scale industrial decarbonisation efforts in the lime and cement industries – combined with the innovative renewable approach by Windship – is an exciting development."

## Windship Technology CEO, Graham Harvey, said,

"We are absolutely delighted with this funding for ourselves and our project partners. Given the significant financial support announced today, the <u>Department for Transport</u> and <u>Innovate UK</u> believe this technology can be a key driver in the clean shipping revolution, and we are proud to be playing our part in the decarbonisation of the shipping industry.

#### About the Clean Maritime Demonstration Competition

The Project is part of the Clean Maritime Demonstration Competition Round 3 (CMDC3), which was announced in September 2022, funded by the Department for Transport (DfT) and delivered in partnership with Innovate UK. As part of the CMDC3, the Department allocated £60m to 19 flagship projects supported by 92 UK organisations to deliver real world demonstration R&D projects in clean maritime solutions. Projects will take place in multiple locations around the UK from as far north as the Shetland Isles and as far south as Cornwall.

The CMDC3 is part of the UK Shipping Office for Reducing Emission's (UK SHORE) flagship multi-year CMDC programme. In March 2022, the Department announced the biggest government investment ever in our UK commercial maritime sector, allocating £206m to UK SHORE, a new division within the Department for Transport focused on decarbonising the maritime sector. UK SHORE is delivering a suite of interventions throughout 2022-2025 aimed at accelerating the design, manufacture and

<sup>&</sup>lt;sup>4</sup> <u>https://unctad.org/system/files/official-document/rmt2019\_en.pdf</u>

<sup>&</sup>lt;sup>5</sup> Calix part of consortium awarded funding to manufacture sustainable fuels from captured CO<sub>2</sub>



operation of UK-made clean maritime technologies and unlocking an industry-led transition to Net Zero.

## **About Windship**

The Windship Technology solution is an auxiliary power system. Each rig is a three-wing foil set of 36 to 48 metres in height, depending on the size of the ship, providing a significant thrust to propel the ship through the water.

Using the Windship system brings a scalable solution that harnesses the use of wind, provides material fuel saving for users, significant global emissions savings, and an important carbon trading opportunity. It also exceeds the 80% CO<sub>2</sub> reduction that will be required by the International Maritime Organization by 2050, taking into account the projected future growth of shipping.

Shipping is the lifeblood of international trade. About 95% of all goods traded are carried on the sea efficiently, at a low cost and safely. The enormous expansion of world trade has reduced poverty worldwide and has improved the quality of life for hundreds of millions of people.

Website: https://windshiptechnology.com/

#### -ENDS-

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

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#### Appendix: Project funding terms

Funding received by the Project from the Clean Maritime Demonstration Competition ("CMDC") Round 3, as part of Innovate UK is subject to the terms of a yet-to-be-executed agreement ("Agreement") with the UK Government.

It is likely that the terms of the Agreement will state that a change in UK Government policy with respect to Innovate UK or DfT, that relates to Innovate UK and/or DfT's obligations under this Agreement, that Innovate UK or the DfT may by notice terminate this Agreement or reduce the scope of the Project, effective from the time specified in the notice.

Further information about the Clean Maritime Demonstration Competition (CMDC) Round 3 is available at: <u>https://apply-for-innovation-funding.service.gov.uk/competition/1313/overview/d85ba3d5-5f6f-4caf-978a-c00c21069024#summary</u>

## 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:	<u>https://www.calix.global/</u>
Twitter:	@CalixLimited
YouTube:	<u>CalixLimited</u>

#### About Leilac

Leilac is the collaborative technology partner accelerating the transition to net zero by providing the most compelling decarbonisation solution for global cement and lime.

Leilac's technology seeks to efficiently separate unavoidable carbon emissions ready for use or storage, without additional chemicals or processes. It is designed to be scalable, retrofittable, energy agnostic and electrification ready to provide flexible and economical pathways to carbon free cement and lime.

Operating across Europe, the Americas and Asia Pacific, Leilac has imagined the future for sustainable cement and lime. And we're creating it. Today.

#### For more information:

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