

Camfridge

Sustainable cooling technology

**Alessandro Pastore,
Executive Director Business Development
Camfridge Ltd.**

apastore@camfridge.com



2022

Mission

- Camfridge's mission is to create sustainable cooling products and has put together a world-class team who passionately share this goal.

Company

- Camfridge is commercializing gas-free magnetic refrigeration technology. This is a deep technology with potentially a wide range of applicability, from domestic to commercial and heat pump appliances.
- Camfridge started operation in 2005, originally a spin-off University of Cambridge. Our patented technology changes how cooling is delivered enabling a step-change in energy efficiency, is largely circularly recyclable and cost competitive.
- Camfridge works with cooling appliance manufacturers (OEMs) and over 40 research centres and suppliers across Europe.
- Company funded to-date by investors and grants (~£15M R&D spend, £1.6 million of which is equity).

Shareholders

- Camfridge has a set of committed early stage investors, who are highly motivated to invest in sustainable technologies that can have a major environmental impact.

Problem: Sustainable and cost-effective commercial cooling



Commercial cooling is a \$46 billion market.

OEM



OEMs design & build commercial appliances

Changing regulatory environment:

- F-gas
- Efficiency
- End-of-life

Highly competitive market.

Limited technology differentiation.

End-users



Commercial users buy many refrigerated appliances

Reduce operating costs (£10s million of savings)

Reduce total cost of ownership (£10s millions of savings)

Reduce carbon emissions (committed to net zero and ESG goals).

NetZero

Demand for cooling is growing rapidly

IEA: The number of cooling appliances will grow from 3.6 billion today, to ~12.5 billion by 2050.

Making NetZero challenging

IEA: It is necessary to avoid ~250 gigatons of CO₂ emissions from cooling to achieve net zero goals.

Current technology is inadequate

Masanori Togawa (CEO of Daikin) stated that for net zero we need “a whole other level of innovation and technological advancements”.

Cambridge’s magnetic technology is such a development

Magnetic cooling is a disruptive, transformational technology

Cambridge

| Technology features | Environmental benefits | End-user benefits |
|----------------------------------|--|---|
| Energy Efficient | Reduce indirect CO ₂ emissions | Up to 40% reduction in operating costs. |
| Circularly Recyclable | Material efficiency for the circular economy | Critical for net zero. |
| Solid state (no refrigerant gas) | Reduce direct CO ₂ emissions | Sidestep regulatory changes. |

Cambridge technology can pay for itself in 12-24 months.

Scalable

Competitive

Recyclable

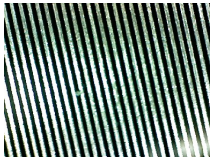
Efficient

Impactful

Enduring

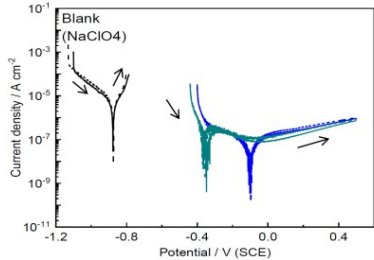
1. Camfridge's modular technology is designed to be produced at scale, where the cost will be ~\$350/kW of cooling, enabled by our mastery of low cost magnetocaloric alloys.
2. Our technology is largely circularly recyclable; this is unique in the market. Circular economy could allow a further and significant reduction in long-term costs and enhance material efficiency, leading to unrivalled cost competitiveness.
3. We measure 58% absolute efficiency in our core cooling components - 40% more efficient (relatively) than the gas compressor, which translates into significantly reduced operating costs for end-users.
4. Prototypes have been tested with Whirlpool, Arcelik/Beko and our system architecture by a leading OEM. A recent study demonstrated that 22% - 43% energy reductions can be achieved in supermarkets through the use of our technology.
5. Recently completed longevity testing cycle demonstrates our components will have endurance of 10+ years against either mechanical deterioration or corrosion.

Industrially Scalable



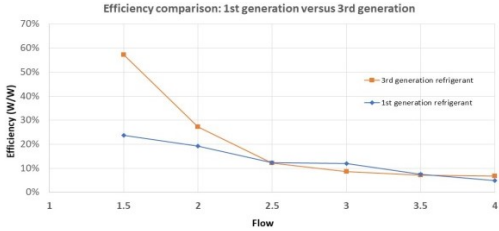
Readily Automated

Enduring



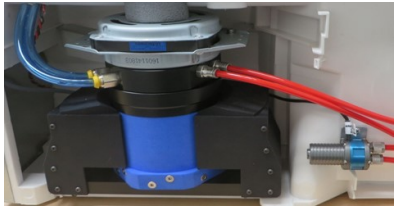
Robust

Modular



Efficient

Adaptable



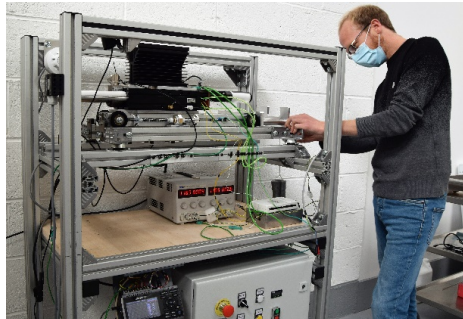
Appliance innovation

Cost competitive: At scale our solution will compete with current cooling technologies on cost.

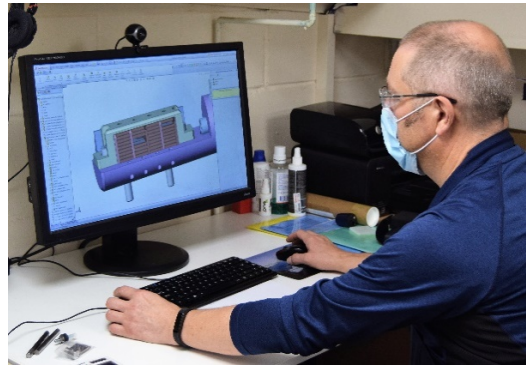
Cambridge team



Six of our eight team members



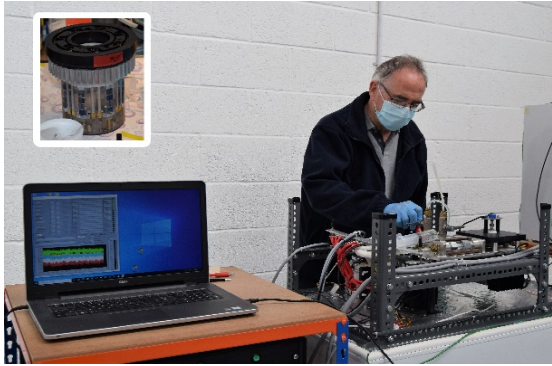
Ed running the acceleration rig for lifetime testing studies



Paul designing system Components in SolidWorks



Rachel preparing plates for regenerator assembly



David performance-testing regenerators



Test system

Route to market is through OEMs, that supply equipment to commercial users of cooling

Camfridge has secured its first OEM partnership for a premium (solar) commercial cooling application.



Camfridge is in negotiation with a European OEM market leader, to develop POC application for a key customer.

... but supported by strong customer pull

Customer Pull: New cooling technologies will deliver corporate Net Zero strategies

In the commercial cooling market, customers are ready and willing to deploy new technologies to achieve net zero goals.



Q: Is this type of refrigeration a good investment for the future?
A: **“without a doubt”**, Head of Energy, Morrisons plc.



The Coca-Cola Company - Climate Change CDP 2021

“As a beverage company, refrigeration that is more energy efficient and contributes less GHG emissions is a key opportunity for The Coca-Cola Co.”



HEINEKEN Net Zero carbon roadmap, 2021

“In HEINEKEN’s journey towards net zero ... low carbon agriculture, green packaging, logistics and cooling innovations will be pivotal.”



<https://www.tescopl.com/sustainability>

“Transport is one of the largest sources of emissions in our own operations, alongside heating and refrigeration.”



Carrefour

2021 Carrefour “Fighting and preparing for climate change”

“Gas, electricity and refrigerants used in store are the main greenhouse gas emitters”. Carrefour now aims to reduce “GHG emissions by 30% by 2030, and 55% by 2040, compared to 2019”

- Camfridge technology delivers the sustainable cooling for commercial customers.
- Our solution is scalable and cost-effective.
- It is also energy-efficient and largely circularly recyclable.

Camfridge will be happy to discuss with Japanese partners how to accelerate the time to market of its innovative and advanced technology in order to develop more efficient end products

Contact to:

Alessandro Pastore,
Business development Executive Director and co-founder
Email: apastore@camfridge.com