

BRAMBLE ENERGY

POWERING NET ZERO

INTRO : 2022



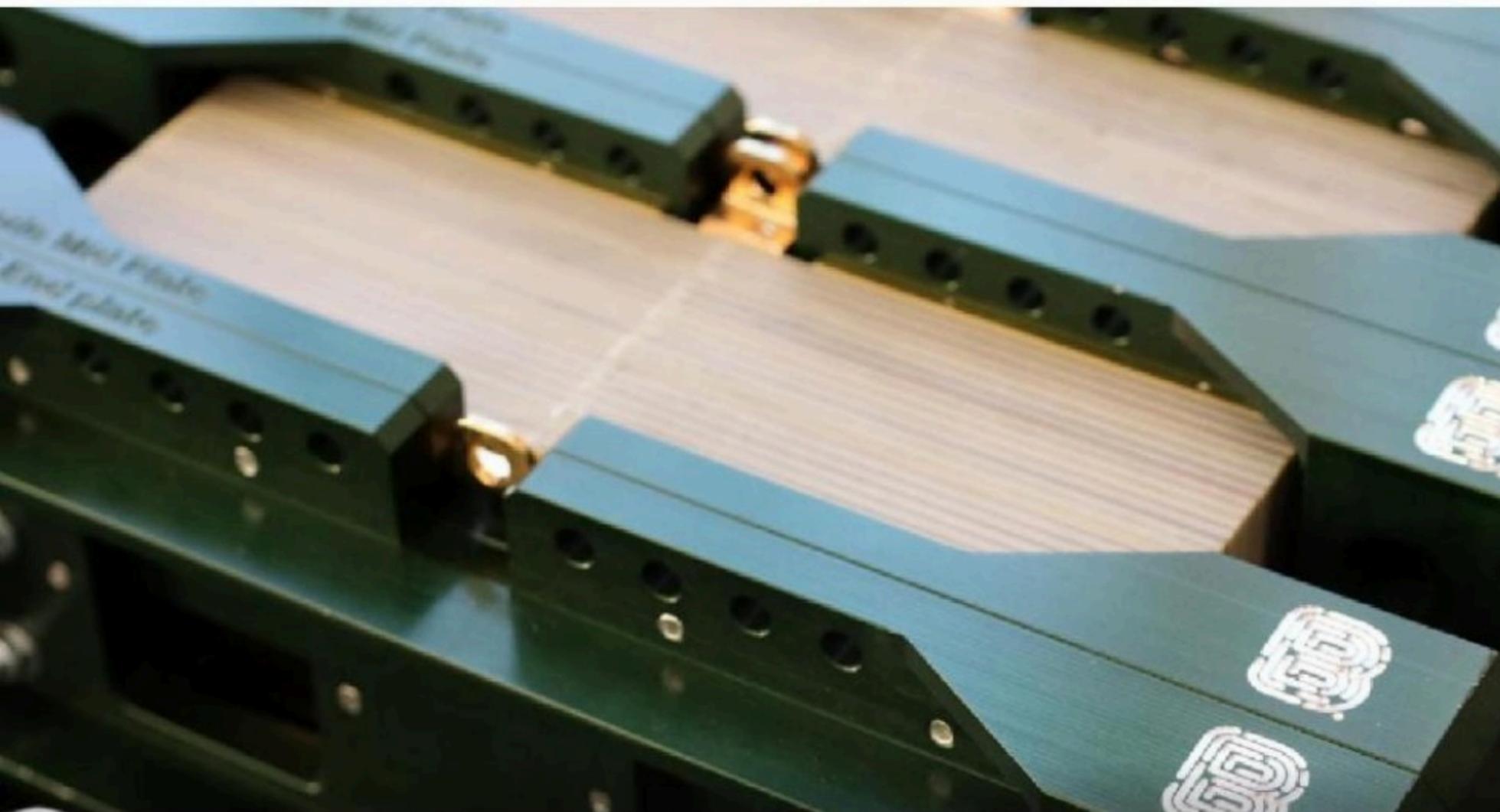
SUMMARY

- ▶ Hydrogen and fuel cells are essential to achieving Net Zero
- ▶ Incumbent fuel cell technologies are not scalable nor do they have a route to improve cost competitiveness with existing electricity storage and generating technologies
- ▶ Bramble Energy has developed the revolutionary PCBFC™ hydrogen fuel cell stack
- ▶ A unique **patent protected fuel cell stack**; manufacturable at scale at any printed circuit board (PCB) factory worldwide, and representing the **only low cost, adaptable, recyclable, rapidly rechargeable and high-power density electrification solution**
- ▶ Bramble Energy's PCBFC™ stack has been integrated into a light commercial vehicle as an electrified range extender. It will also be demonstrated with commercial partners for marine applications during 2022 and we are forming strategic partners to decarbonise other sectors and industries.
- ▶ Our low power, zero emission, diesel generator replacement products are with launch customers and will be commercially available in 2022



A REVOLUTIONARY FUEL CELL

A disruptive fuel cell company with patent protected, revolutionary design and manufacturing routes based on existing global PCB supply-chain infrastructure.



We didn't just improve existing fuel cell stacks; we reinvented them: The PCBFC™

▶ SCALABLE

▶ LOWEST COST

▶ ADAPTABLE

MANUFACTURABLE ANYWHERE

Manufacturing the PCBFC™ doesn't require a bespoke factory as it leverages the already existing PCB industry and supply chain.

Rapid, cost-effective scalability at any PCB facility worldwide



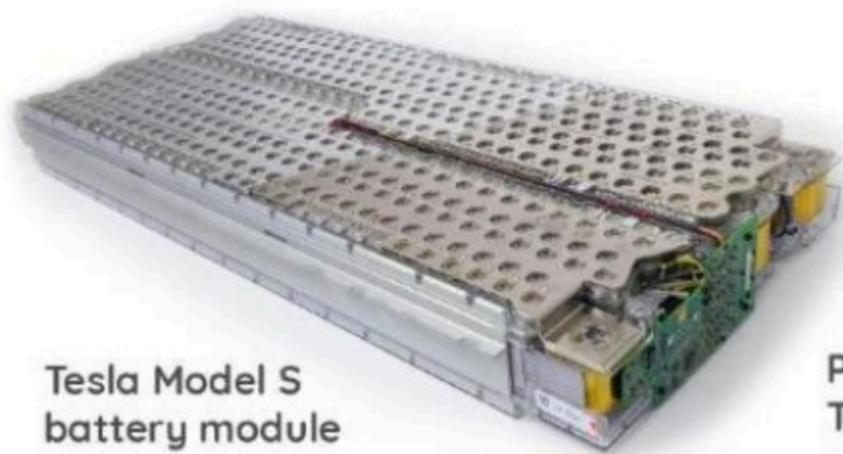
AVAILABLE
EVERYWHERE

DISTRIBUTABLE, **ADAPTABLE**, FLEXIBLE

Unlike traditional fuel cell companies, Bramble Energy's digital tooling can achieve a **rapidly adaptable form-factor**, with minimal turn-around time and cost.

PCBFC™ is not confined to typical fuel cell manufacturers' monolithic blocks; instead it achieves power requirements through a combination of distributed innovative stack designs and sizes.

Voltage and current profiles can be readily tailored for applications unlike traditional technologies.



Tesla Model S
battery module

PCBFC™ developed to fit
Tesla Model S battery
module form factor



PORTABLE POWER PRODUCTS

Bramble Energy's SD range is a zero emission, lightweight low power source capable of delivering up to 1 kW of silent, long term power. It launches in 2022 and has been developed in collaboration with BOC (A Member of the Linde Group).

With a 20L BOC Genie containing 7.5kWh, a 15W unit provides continuous energy for 500 hours before cylinder replacement



PORTABLE POWER APPLICATIONS



MOBILE EQUIPMENT RE-CHARGE

Continuous power while you have hydrogen so your charger can be as mobile as your teams and their equipment



ENVIRONMENTAL SENSING

Long-duration and reliable power for monitoring your environmental impact when you have no connection to the grid



CCTV AND SURVEILLANCE

Scalable, adaptable and silent power supplies for individual cameras, larger systems or support to covert operations



OFF-GRID LIGHTING

Zero emission and highly flexible solutions where you want the best possible working conditions for your people

MOBILITY PRODUCTS

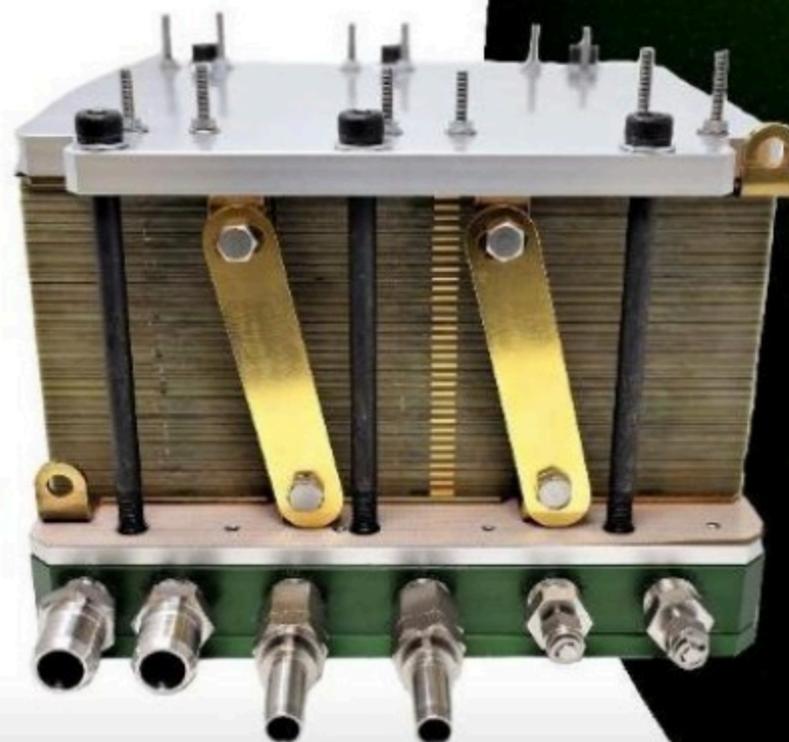
The high power PCBFC™ is an agnostic power source that can be used to replace any diesel engine.

In collaboration with MAHLE Powertrain the first PCBFC™ demonstration vehicle was launched at **Cenex LCV 2021**. Bramble Energy is launching a series of marinised fuel cells with commercial partners for maritime applications in 2022.

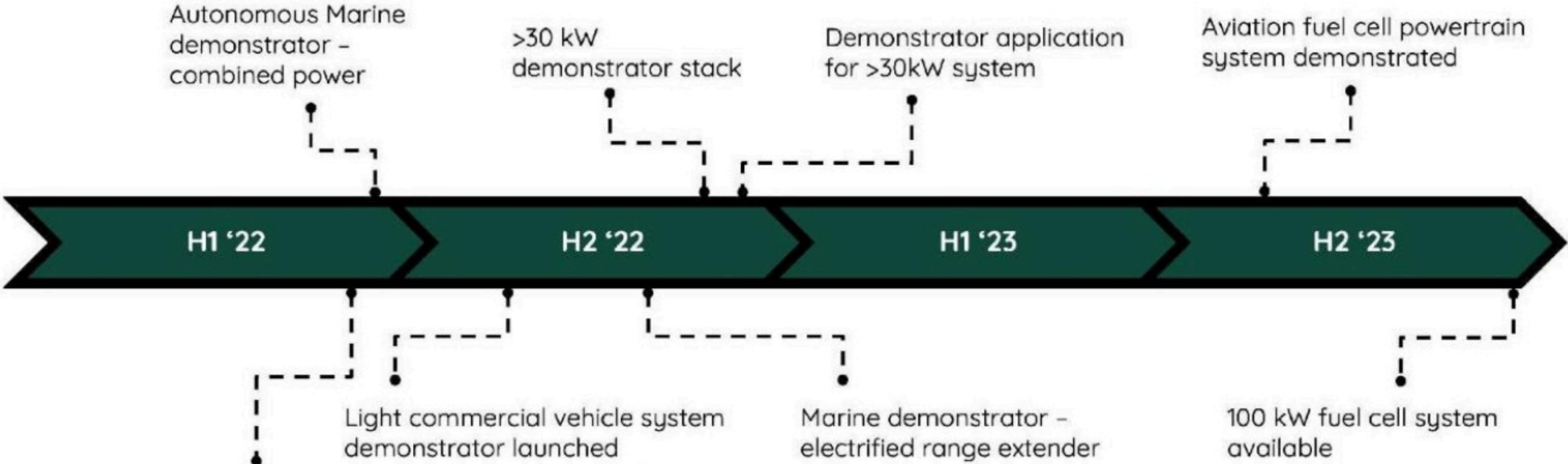
Along with strategic partners, Bramble Energy's PCBFC™ technology can be tailored, designed and manufactured and is capable of decarbonising multiple applications, industries and sectors.



Launched at
Cenex
LCV Event 2021



MOBILITY PRODUCTS - TIMELINE



Autonomous Marine demonstrator - combined power

>30 kW demonstrator stack

Demonstrator application for >30kW system

Aviation fuel cell powertrain system demonstrated

H1 '22

H2 '22

H1 '23

H2 '23

Light commercial vehicle system demonstrator launched

Marine demonstrator - electrified range extender

100 kW fuel cell system available

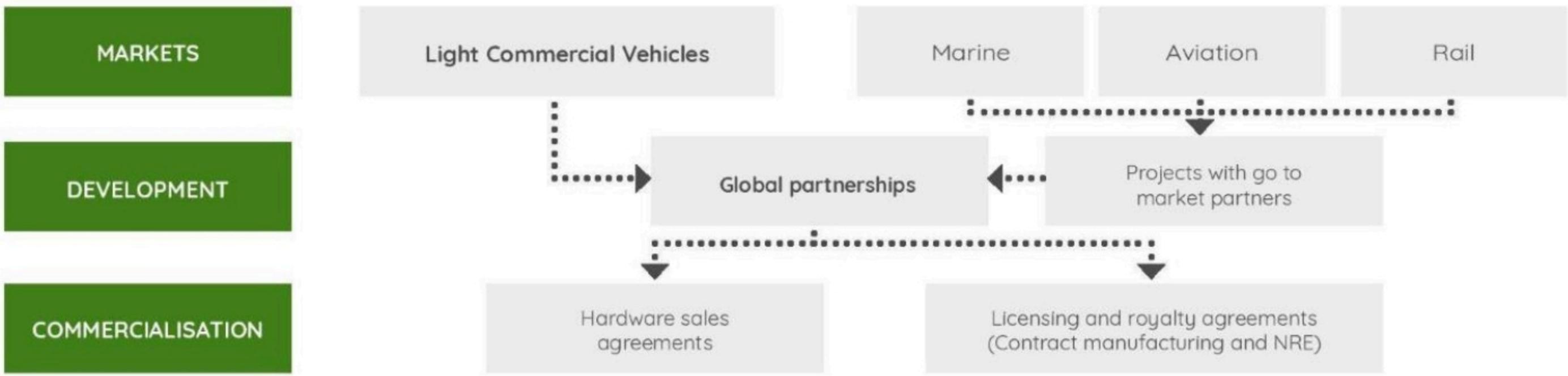
Automotive quality fuel cell short stack available for sale/demo



MOBILITY MARKET OPPORTUNITY

Along with strategic partners, Bramble Energy's PCBFC™ technology can be tailored, designed and manufactured and is capable of decarbonising multiple applications, industries and sectors.

We are flexible and are able to provide hardware sales and / or licensing agreements on request for any market



OUR COMPETITIVE ADVANTAGE

	TRADITIONAL FUEL CELL TECHNOLOGIES		BRAMBLE ENERGY
	GRAPHITE PLATE	METAL PLATE	PCBFC™
Cost Efficient?	 Highest cost base (\$/kW)	 Gold coatings increase cost	 Clear pathway to lowest cost stack
Simplified BoM?	 Large bill of materials	 Large bill of materials	 c.4x fewer components ¹
Adaptable Solution?	 Monolithic blocks	 Monolithic blocks	 Fully customisable
Low CAPEX Outlay?	 Significant CAPEX outlay	 Significant CAPEX outlay	 £0 manufacturing CAPEX spend
Robustness / Longevity?	 Fragile construction	 Poor lifetime metrics	 Robust & durable

1. Compared to traditional fuel cells





THANK YOU

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