ICAO ENVIRONMENT

2023 ICAO STOCKTAKING

SAF-LAB Exhibition

11 to 13 JULY 2023

Montréal, ICAO Headquarters

ICAO 2023 STOCKTAKING

Cranfield University

Cranfield Aerospace Solutions

James Angus, Commercial Director of the Integrated Vehicle Health Management (IVHM Centre)

Professor Sir Iain Gray, Director of Aerospace, SATM, Cranfield University

Aviation Sustainability at Cranfield

Cranfield University

creating leaders in technology (focused on Aerospace and Defence) and management

exclusively postgraduate university with 50% of our students from outside UK.

internationally recognised

unique facilities (inc. Global Research Airport)

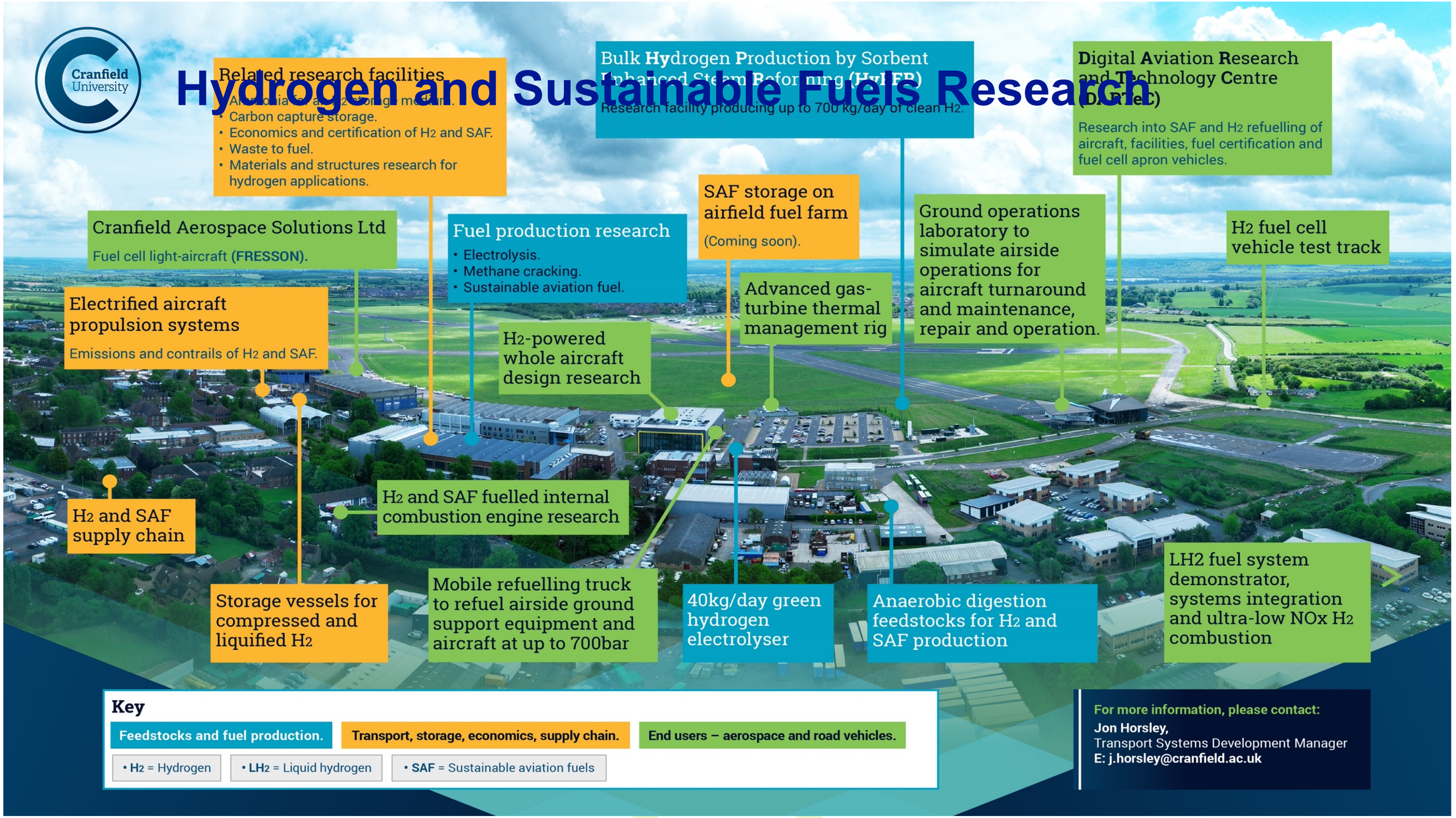
transitioning blue sky concepts into operational environments

research capabilities in aviation and the environment

Digital Aviation Research & Technology Centre (DARTeC)

Link to Brochure: https://www.cranfield.ac.uk/themes/aerospace/aviation-and-the-environment

Hydrogen and Sustainable Fuels Research



Hydrogen and Sustainable Fuels Research

Developments since the last Stocktaking event:

- Major new development of Cranfield's Global Research Airport – over £3m (Research England RPIF*) investment to enhance our airport's net zero research capabilities with: *low/zero emission vehicles, fuel-cell grade hydrogen production & re-fuelling and growth of our site-wide Living Lab environment monitoring network*
- Propulsion - Cranfield's work in low NOx and Hydrogen combustion technologies is nationally recognised and world-leading. Current total research budget excess of £4m**.
- Cranfield Hydrogen Gateway (www.cranfield.ac.uk/hydrogen)
- Last September we delivered our 2022 Global Aviation Summit – Raising Ambition to address Climate Change & Biodiversity (in partnership with Air Transport Action Group). Starting in Oceania, this event followed the sun, lasted 13 hours and covered 6 global regions.
- This year we are launching Global Sustainable Aviation Forum – bringing together industry and academia globally to focus on the biggest challenges* that must be addressed before 2030 if we are to achieve aviation's 2050 targets (contact: L.H.Rice@cranfield.ac.uk)

Images courtesy of Fuel Cell Systems, Ziegler, and Eagle Tugs, and may not be indicative of suppliers or products chosen

*Research England's Research Partnership Investment Fund

** Projects include: ATI Fly Zero programme; EU Horizon MINIMAL & ENABLE H2; UKRI/ATI HYEST & LH2GT; Clean Aviation HEAVEN

Cranfield Aerospace Solutions

1989	25 years	£26m	100+
CAeS established	Modification experience	Investment raised to date(1)	Highly skilled employees

- CAeS is a world leader in complex aircraft modifications and new aircraft design
  - Delivered cutting-edge products for Airbus, Boeing, Rolls-Royce, Raytheon and others
  - Holds critical Design Organisation (DOA), Production Organisation (POA) and Maintenance Organisation (MOA) approvals
  - Track record of securing regulatory certifications from UK CAA, EASA, US FAA & others
- Three business activities
  - Development of zero emissions propulsion systems for commercial aircraft
  - Aircraft Maintenance, Repair & Overhaul (MRO)
  - Design and manufacture of flight and motorsport simulators
- Access to unique aviation expertise, research and resources
  - CAeS is located at Cranfield Airport, a commercial and research facility
  - Cranfield University, an academic world leader in aerospace, is a shareholder

Designed & manufactured sub-scale blended wing flight test vehicle

Designed & certified modifications to convert BAE 146 to atmospheric research aircraft

Track record, operating businesses and regulatory approvals strongly differentiate CAeS from competitors

(1) ATI funding, Series A & £4m CLN

THE HYDROGEN ISLANDER (Fresson Project)

A ZERO-CARBON FUTURE FOR SUB REGIONAL TRAVEL

Britten-Norman

Cranfield Aerospace Solutions

- Zero CO_2 emissions & less air pollution
- 6 to 8 passengers
- 60 minutes endurance (45 minute reserve)
- 200km + reserve
- Noise reduction and less vibration
- Lower operating costs Reduced by up to 50%
- Entry into service by 2026

The conversion of a Britten-Norman Islander 9-seat aircraft from conventional fossil fuel to that of gaseous hydrogen propulsion is set to deliver the world's first fully certified, truly green, passenger-carrying aircraft.

CO_2 reductions	100%
Level of finance required	£30M
Timeframe (EiS)	2026
Main challenges	A. Fuel tanks B. Thermal Mngt C. Infrastructure

THE HYDROGEN ISLANDER (Fresson Project)

A ZERO-CARBON FUTURE FOR SUB REGIONAL TRAVEL

Developments since the last Stocktaking event:

- Project progress:
  - Detailed preliminary and critical design reviews largely complete.
  - Baseline flight testing of the demonstrator aircraft underway
  - Component testing is underway
  - Iron bird testing to start soon.
- Working with Cranfield University and Cranfield Airport on electrolyser-mobile refueller + growing engagement with the UK CAA.
- Heads of Terms (HoT) signed for a proposed merger with Britten-Norman. Est completion this August*
- On-going discussions with advisory groups to support the development of standards for zero emissions flight

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*(https://www.aviationbusinessnews.com/low-cost/new-uk-green-aircraft-business-formed-to-accelerate-transition-to-zero-emissions-flight/)

Thank You

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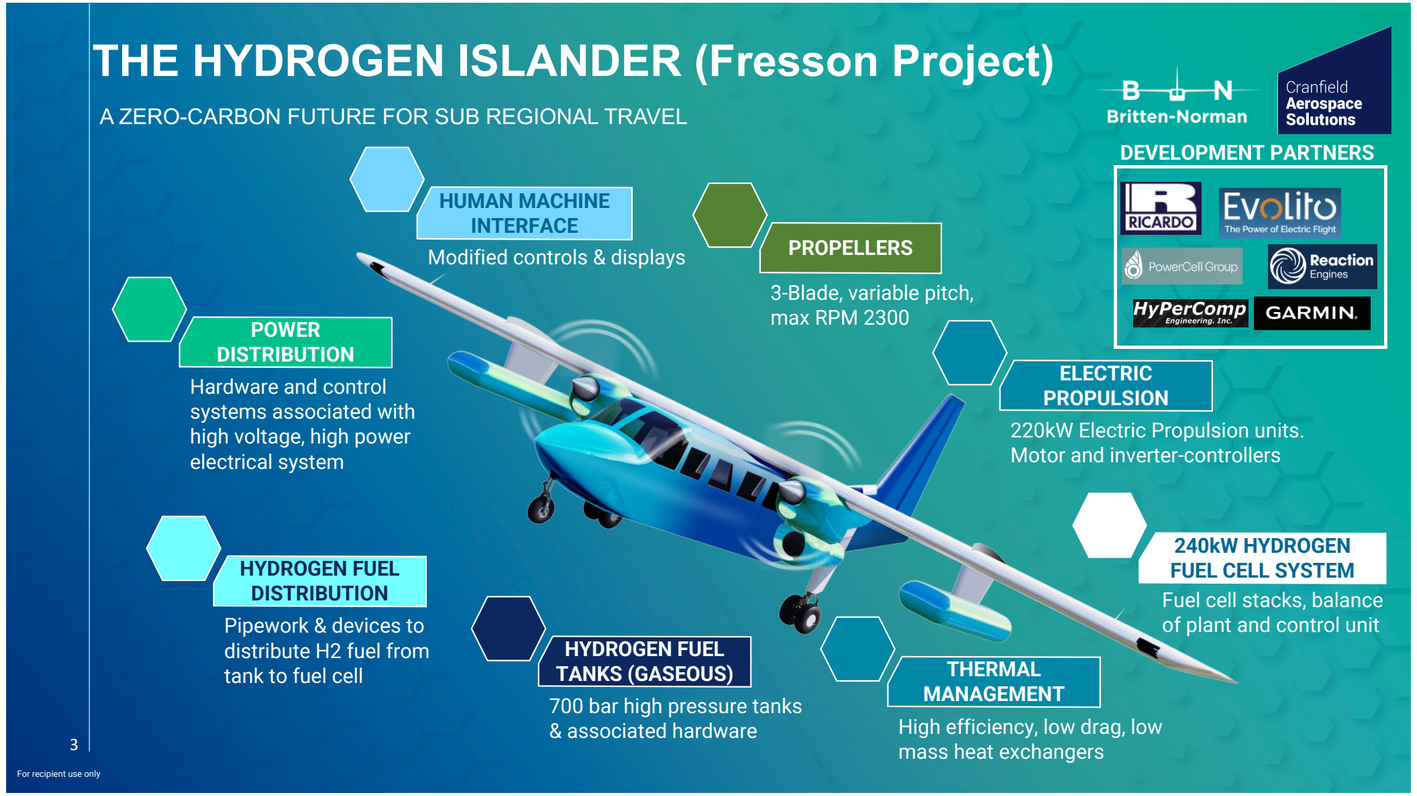
Hydrogen Islander (Project Fresson)

Technology



CO_2 reductions (propulsion)	100%
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